United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
Ohio Department of
Natural Resources,
Division of Soil and Water
Conservation; Ohio
Agricultural Research and
Development Center; Ohio
State University Extension;
Erie Soil and Water
Conservation District; and
Erie County
Commissioners

Soil Survey of Erie County, Ohio

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

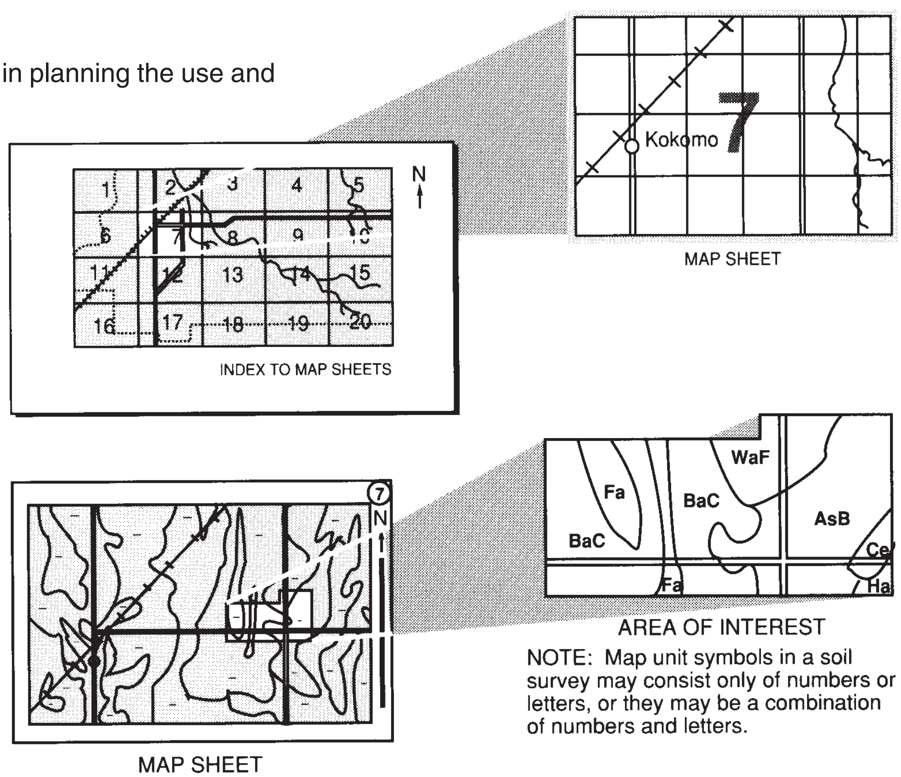
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly 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 1992. Soil names and descriptions were approved in 1998. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. This survey was made cooperatively by the Natural Resources Conservation Service; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; the Ohio Agricultural Research and Development Center; the Ohio State University Extension; the Erie Soil and Water Conservation District; and the Erie County Commissioners. The survey is part of the technical assistance furnished to the Erie Soil and Water Conservation District.

Cover: Sunset at Sheldons Marsh in Erie County, Ohio. (Photograph courtesy of Arnold W. Ehrsam)

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.

Contents

Issued January 2006

Foreword

This soil survey contains information that affects land use planning in Erie County, Ohio. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information is available at the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Terry J. Cosby
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Erie County, Ohio

By Rick A. Robbins and Neil H. Martin, Ohio Department of Natural Resources,
Division of Soil and Water Conservation

Fieldwork by N.H. Martin, S.T. Prebonick, J.R. Svoboda, and J.W. Kerr,
Ohio Department of Natural Resources, Division of Soil and Water Conservation

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Ohio Department of Natural Resources, Division of Soil and Water Conservation;
the Ohio Agricultural Research and Development Center; the Ohio State University
Extension; the Erie Soil and Water Conservation District; and the Erie County
Commissioners

ERIE COUNTY is in north-central Ohio (fig. 1). It is bordered by Lake Erie to the north, Lorain County to the east, Huron County to the south, Sandusky County to the west, and Ottawa County to the northwest. The county includes Kelleys Island, which is the second largest island in Lake Erie. Erie County has a total area of 181,587 acres, or 283 square miles. In 1990, the population of the county was 76,779. Sandusky, the county seat, had a population of 29,764 (U.S. Department of Commerce 1990).

Industry and farming are the major enterprises in Erie County. The county supports strong manufacturing and tourism industries. It has both light and heavy industrial plants. The automobile industry employs a large portion of the county's workforce. There are also strong retail and service sectors in the county. About 35 miles of shoreline provides income-producing opportunities for marinas, sport fishing companies, private beach owners, and other tourist industries. Cedar Point, one of the Nation's largest amusement parks, is in Erie County. Firelands College, a branch campus of Bowling Green State University, provides local educational opportunities.

Most agricultural land is used for cash-grain crops. Hay, corn, wheat, and soybeans are the principal crops. Sugar beets and specialty crops, such as cabbage, tomatoes, and melons, are also grown. Dairy and livestock enterprises are also important sources of revenue. There are some vineyards and orchards in the survey area. A small percentage of land is devoted to woodland. This land is generally on steep slopes along major streams and in undrained areas.

Figure 1.—Location of Erie County in Ohio.

This survey updates an earlier soil survey of Erie County published in 1971 (Redmond and others 1971). It provides additional information and has larger maps. It also provides updated photographic imagery.

General Nature of the County

This section provides general information about the county. It describes climate; history; physiography, relief, and drainage; glacial geology; bedrock geology; natural resources; and transportation facilities.

Climate

Erie County is cold in winter and hot in summer. Lake Erie provides a tempering influence during the summer and fall. Winter precipitation, frequently in the form of snow, results in a good accumulation of soil moisture by spring and minimizes drought during the summer. Normal annual precipitation patterns are adequate for all of the crops that are adapted to the temperature and the growing season in the survey area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at the Sandusky, Ohio, climate station in the period 1961-90. Table 2 shows probable dates of the first freeze in fall and the last freeze in the spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 27 degrees F and the average daily minimum temperature is 20 degrees. The lowest temperature on record, which occurred on January 21, 1985, is -17 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 80 degrees. The highest recorded temperature, which occurred on July 14, 1936, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 34 inches. Of this, about 20.6 inches, or nearly 61 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 6.01 inches on July 12, 1966. Thunderstorms occur on about 37 days each year, and most occur in June.

The average seasonal snowfall is 27.4 inches. The greatest snow depth at any one time during the period was 25 inches. On the average, 32 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year. The heaviest 1-day snowfall on record was 14 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 84 percent. The sun shines 64 percent of the time possible in summer and 41 percent in winter. The prevailing wind is from the west-southwest. Average wind speed is highest, 11 miles per hour, in March.

History

The county was populated mainly by people of the Erie Tribe until their defeat by the Iroquois Confederacy. Other Native Americans that inhabited the area were from the Wyandotte, Ottawa, Chippewa, Delaware, and Seneca Tribes.

The first Europeans in the area were French traders. France later gave up any claim to the land when it signed a treaty with Great Britain in 1763. Great Britain lost control of the land 20 years later after the Revolutionary War.

The land in Erie County was originally part of the State of Connecticut’s Western Reserve. The county was also designated as the “Fire Sufferer Lands.” This name was later shortened to “The Firelands.” Tracts of land in this reserve were used to compensate citizens of Connecticut who suffered severe property losses at the hands of the British during the Revolutionary War.

Erie County was established in 1838. It was established because Sandusky had become a natural center of commerce in the area and there was a statewide trend to reduce the size of the larger counties.

Shipping was an important part of the county’s history and development in the early years. The Erie Canal linked Lake Erie to the Hudson River, providing access to East Coast markets for northern Ohio products.

Physiography, Relief, and Drainage

Erie County is part of the Central Lowland Province. As an area of lake plain and till plain physiography, Erie County has relatively uniform, level topography. The highest point in the county, in Berlin Township, is 320 feet above the approximate mean level of Lake Erie. Most of the county has a slope of 6 percent or less. The steeper areas generally are a result of deep stream dissection. Beach ridges and bedrock ridges account for a small percentage of the steeper areas.

Erie County drains northward into Lake Erie. There are 17 distinct watershed areas in the county. The primary watersheds include Mills Creek and Pipe Creek to the west, the Huron River in the central part of the county, Old Woman Creek in the east-central part of the county, and the Vermilion River on the eastern edge of the county. The other watersheds are drained by small creeks.

Glacial Geology

Richard R. Pavey, Ohio Department of Natural Resources, Division of Geological Survey, helped to prepare this section.

Significantly later in geological time (about 2 million years ago), glaciers began to move across the area in a southern and western direction. Many glacial advances, with ice as much as 1 mile in thickness, followed by subsequent melting and recessions, filled valleys and low bedrock areas with glacial till and lacustrine sand, silt, and clay. The late Wisconsin glaciers, approximately 15,000 to 24,000 years ago, were the last glaciers to cover Erie County. The glacial ice gouged out a preglacial river valley to form the Lake Erie Basin. As sheets of ice advanced uphill out of the basin, high bedrock areas obstructed glacial deposition, leaving the bedrock hills thinly covered with drift or completely exposed. Examples of soils that formed in a thin mantle of glacial material over bedrock include Mitiwanga and Millsdale soils. Brecksville and Wakeman soils formed in residuum on rock outcrops.

Away from the bedrock hills, thicker layers of glacial material were deposited. As the ice sheet melted and receded, the unsorted material carried by the glacier was deposited in a fairly uniform layer known as glacial till. The thickness and composition of glacial till vary widely within the county. Soil formation in the till is generally only a few feet thick. Where these till layers were very thin or eroded away, soils formed in older, harder till. The clay content of the till is highest near Lake Erie and lowest near bedrock areas where the ice sheets eroded and transported some of the coarser local material. Bennington, Miner, and Pewamo soils are examples of soils formed in glacial till.

As the glacial ice was receding for the last time, the Lake Erie Basin was filled by a series of different lakes that formed in front of the ice sheet. For a few thousand years, lake levels varied in these lakes as drainage outlets were blocked or opened by the fluctuating ice front of the last glacier. Lacustrine sediments settled out of the water in these glacial lakes. Many soils in the county formed in these lacustrine deposits, including the Del Rey, Fulton, and Toledo soils.

Fluctuating lake levels and wave action formed wave-erosion-enhanced cliffs, smoothed out shallow bottom areas, wave planed the glacial till, and provided coarse sediments to form beaches. Beach ridges throughout the county are products of these earlier lake levels. Chili, Fox, and Oshtemo soils formed in these materials. Scattered throughout the county are peculiarly shaped segments of old beach ridges. These remnants provide evidence of the reworking of beach sediments during subsequent higher lake levels, caused by slight readvances of the ice sheet far to the north. In shallow water areas, wave action washed the finer sized particles out of the glacial material, leaving patches of coarser sediments on top of the glacial till. Haskins and Mermill soils formed in this water-modified glacial till material.

Through erosion, river levels stayed in balance with the fluctuating lake levels. Offshore sands were deposited in shallow water near the lake boundaries. Deltas formed where rivers and streams met the various lake levels. Deltaic deposits are particularly evident in the Milan Township area. As the stream waters entered the lake and lost velocity, sands were deposited first. Silts were deposited in the somewhat deeper areas, and clays were deposited in the deepest areas. Kibbie and Tuscola soils formed in such deltaic deposits. These natural processes continue along the present-day Lake Erie shoreline.

In northwestern Margaretta Township, subterranean springs and seepage areas developed at the base of limestone cliffs. The calcium-carbonate-charged water flowing from the limestone bedrock formed calcareous tufa rock on top of the earlier deposited lacustrine sediments. Sandusky and Weyers soils formed in this type of parent material.

Sinkholes occur in limestone bedrock-controlled areas of the county. Carbon dioxide from the atmosphere mixes with rainwater and forms a weak acid solution, which dissolves the carbonate rock as it percolates through cracks in the bedrock. Some sinkholes are small funnel-shaped openings that are 1 to 2 feet in diameter at the surface; others are filled with soil material and may remain unnoticed unless the bedrock is exposed during excavation activities. Larger sinkholes form when the collapse of the unsupported roof of an underground cavity leaves a depression in the landscape. Soils that are shallow to bedrock, such as Ritchey soils, and moderately deep soils, such as Milton and Castalia soils, can include sinkhole areas. Short, shear-faced ledges delineate the perimeter of some old sinkholes. Rock outcroppings are included in some units.

In the past, sinkholes have been used as outlets for surface and subsurface drainage and for septic tank effluent. This practice can result in the pollution of ground water. Some sinks will discharge ground water as subsurface water rises during prolonged periods of heavy rainfall.

Bedrock Geology

Richard R. Pavey, Ohio Department of Natural Resources, Division of Geological Survey, helped to prepare this section.

Erie County, which is in the eastern part of the Central Lowland Province, consists primarily of lake plain physiography, but till plain physiography occurs in the southeastern part of the county (ODNR, Division of Geological Survey 1998). Bedrock outcroppings are common throughout the county.

Proceeding from west to east in Erie County, the underlying bedrock dips and becomes progressively younger. The bedrock within the county is of sedimentary origin, primarily limestone, dolostone, shale, and sandstone. The Silurian bedrock is primarily limestone and dolostone. The Devonian bedrock is primarily limestone, dolostone, and shale. The Mississippian bedrock is primarily shale and sandstone (ODNR, Division of Geological Survey 1947)

The Bass Island and Niagara Groups of the Silurian System underlie the western sections of the county, especially in Margaretta and Groton Townships. Salina Dolostone occurs at Crystal Rock in the northwestern part of Margaretta Township. Prout Limestone forms a narrow band near the surface in the southeastern part of Groton Township and the southern part of Perkins Township. Plum Brook Shale is in the northwest corner of Oxford Township. Ohio Shale of the Devonian System extends from the west-central part to the northeastern part of the county and occurs in the cliffs along the Vermilion River. Bedford Shale and Berea Sandstone of the Mississippian System are in the southeastern part of the county, beginning with a line extending from the northeastern part of Vermilion Township to the southwestern part of Berlin Township.

During the period ranging from the Silurian to Mississippian Systems (420 to 350 million years ago), Erie County was covered by a large, tropical inland sea. In the deeper areas, sediments consisting of deposits of carbonate precipitates, shells, and corals formed limestone and dolostone. Silt and clay sediments formed shale, while quartz and other silicate minerals were deposited and formed sandstone in shallow water areas. As sedimentation and cementation continued, the pressures generated by the tremendous weight of the overlying sediments helped to form the bedrock of the county.

This depositional stage was followed by a prolonged period of geologic erosion that left a landscape of bedrock hills and stream valleys. Surface water drained northward into a large, eastward-flowing valley that occupied the present-day Lake Erie Basin. Erosion left the oldest bedrock units exposed in the northwestern part of the county and the youngest exposed towards the southeastern part.

Natural Resources

The natural resources of the county include water, sand and gravel, and some layers of bedrock.

The ground water in Erie County varies considerably in quality and quantity. Water is obtained from glacial material or bedrock, depending upon the location of the well site. Surface runoff, infiltration rates, and geologic material affect the water supply. Glacial deposits with lenses and stratified layers of sand and gravel are typically good sources of water and yield from 20 to 250 gallons per minute; however, most wells in areas of glacial deposits have low yields, generally less than 10 gallons per minute (ODNR, Division of Water 1986). The yield of wells drilled in bedrock varies according to the area of the county and the type of geologic material.

Areas underlain by cavernous limestone bedrock in the northwestern part of Erie County can yield up to 500 gallons per minute (ODNR, Division of Water 1986). A large quantity of the ground water obtained from limestone formations in the western part of the county has a potential for contamination resulting from underground disposal of wastewater. The water from some wells drilled in limestone has high concentrations of hydrogen sulfide.

In areas of Berea Sandstone, yields are generally less than 10 gallons per minute because of the thickness and recharge potential of this material. A large portion of Erie County is underlain by shale bedrock. Wells drilled in shale bedrock typically have low yields of less than 5 gallons per minute. They also may have high levels of hardness and mineral concentrations.

Dug wells, cisterns, and ponds are sometimes used to meet water demands in the county. Lake Erie is also a source of water. Control of surface- and ground-water pollution is needed to ensure a quality water supply. Information regarding specific sites may be obtained at the office of the Ohio Department of Natural Resources, Division of Water, in Columbus, Ohio.

Sand and gravel for local usage have been mined in the past from beach ridges and dunes that are on the lake plains. Sand is still mined in a few areas of the county.

Rock quarries have provided building stone in the past. Limestone and sandstone are still quarried for local use.

Transportation Facilities

Erie County is accessible by land, water, and air. U.S. Highway 6 passes through the county. The Ohio Turnpike (Interstate 80/90) crosses the county and provides rapid access to the metropolitan areas of Cleveland and Toledo. Additional highway access is provided by six Federal and State highways. State highways and a system of well paved county and township roads provide easy access to all areas of the county. Two major railroad lines traverse the county.

Shipping access to Lake Erie is available in Huron, Sandusky, and Vermilion. Numerous public or private boating facilities are available along the shoreline.

Two airports, Griffing Sandusky Airport and the Erie-Ottawa Regional Airport, are located in the county.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, variations in the intensity of mapping or in the extent of the soils in the survey areas, and the use of the State Soil Geographic data (STATSGO) map as the base for the general soil map.

Survey Procedures

Erie County was one of the first counties in the State of Ohio to have a soil survey modernization. The general procedures followed in making this survey are described in the National Soil Survey Handbook (USDA n.d.) of the Natural Resources Conservation Service. The “Soil Survey of Erie County, Ohio,” issued in February 1971 (Redmond and others 1971) and U.S. Geological Survey (USGS) topographic quadrangles were among the references used.

Prior to the soil survey modernization, a soil survey review team conducted an evaluation of the 1971 Erie County soil survey at the request of the Erie County Commissioners. A report of the evaluation was prepared and sent to the Ohio Soil Inventory Board for review. After reviewing the evaluation report, the Soil Inventory Board recommended a soil survey modernization program and outlined the work to be completed for the soil survey modernization.

Before the actual fieldwork was begun, a detailed study of all existing laboratory data, soil survey reports, and research studies was conducted by the Erie County soil survey staff. The soil scientists used USGS topographic maps, at a scale of 1:24,000, to relate land and image features.

Erie County includes a large number of soil series. The 1971 soil survey is a valuable historical document that was relied on extensively during the modernization process. Patterns of soils on the landscape are typically complex. Modern soil survey procedures differ from those used in the earlier survey. Some soil series names used in the earlier report no longer apply to the soils that were mapped and correlated during this update. Soil scientists making the 1971 survey did not recognize all of the soil series that current soil scientists using modern taxonomy and classification recognized during this survey. In addition, soil observations and evaluations during the 1971 survey were made to a depth of 60 inches or less, and during this modernization project, observations and evaluations were routinely made to a depth of 80 inches or to bedrock.

Recent aerial photographs, photographs from earlier flights, a geology map of Ohio (ODNR, Division of Geological Survey 1947), and the USGS quadrangles were used in making the survey. The maps and soil descriptions in the previous soil survey of Erie County were used as references in the correlation of soil series and map units (Redmond and others 1971). The old survey was also used to determine the areas of highest variability when the mapping and transect intervals were planned.

A reconnaissance was made by vehicle before the soil scientists traversed the surface on foot and examined the soils. As they traversed the surface, the soil scientists divided the landscape into segments based on the use and management of the soils. For example, a rise would be separated from a depression or a gently sloping knoll or a backslope would be separated from a flat. Soil map units were traversed at varying intervals depending on the complexity of the soil types and patterns in the area. Sample map units from the 1971 survey were transected. Borings were made at selected intervals on the transect to determine the composition of soil types within the map units. Soil scientists compared existing map units with the soil types in the area to see if earlier unrecognized soils with significant interpretive differences should be identified and separated during the survey modernization. Map unit boundaries were determined on the basis of soil examinations, observations, and photo interpretation. When necessary, map units were redelineated so that new series could be included and soil types recognized earlier could be better differentiated. Some map units were enlarged to include units previously mapped as another soil type when the differences in soil properties were not significant enough to require an additional map unit delineation.

After completion of the fieldwork, map unit delineations were transferred by hand to another set of photographs. Surface features were recorded from observation of the maps and the landscape.

Representative pedon sites from the 1971 survey were located, and the soils at these sites were examined in order to determine if they would meet present-day interpretation needs. The classification of these pedons also was compared with modern soil taxonomy standards. If the pedon was found to differ significantly in characteristics, a new pedon site was located that had soil properties that were representative of observations made during this soil survey.

Most soils were examined using hand augers and soil tubes. Field notes were taken during the evaluation process. Deeper samples were taken to document soil material to a depth of 80 inches or to bedrock if it was within a depth of 80 inches. These samples were obtained by taking soil cores using a probe truck or using a hand auger with extensions. Pedons described as typical were studied and documented in dug pits. Samples for laboratory analyses were taken at these pits and at other locations in the county to obtain chemical and physical analyses and to determine engineering properties. This information was used in the classification, correlation, and interpretation of specific soil types.

The samples for chemical and physical analyses were taken from representative sites of several of the soils in the county. These analyses were made by the Soil Characterization Laboratory, School of Natural Resources, The Ohio State University, in Columbus, Ohio. The results of these analyses are stored in a computerized data file at the laboratory. The analyses for engineering properties were made by the Ohio Department of Transportation, Division of Highways, Testing Laboratory, in Columbus, Ohio. The laboratory procedures can be obtained on request from the respective laboratories. The results of the analyses can be obtained from the School of Natural Resources, The Ohio State University; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the Ohio State Office of the Natural Resources Conservation Service in Columbus, Ohio.

General Soil Map Units

The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Toledo-Fulton

Very deep, level and nearly level, very poorly drained and somewhat poorly drained soils that formed in lacustrine deposits

Setting

Landform: Lake plains (fig. 2)
Slope range: 0 to 2 percent

Composition

Extent of the map unit: 6 percent of the county
Extent of the soils in the map unit:
Toledo and similar soils—58 percent
Fulton and similar soils—20 percent
Minor soils—22 percent

Soil Properties and Qualities

Toledo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas, depressions
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay or silty clay loam
Slope: 0 to 1 percent

Fulton

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Slight rises, flat areas
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay loam
Slope range: 0 to 2 percent

Minor Soils

- The moderately well drained Shinrock soils on backslopes and shoulders along drainageways
- The very poorly drained and poorly drained Holly soils on flood plains

Use and Management

Major uses: Cropland
Management concerns: Ponding, wetness, compaction, slow or very slow permeability, tilth, crusting

2. Del Rey-Milford

Very deep, level and nearly level, somewhat poorly drained to very poorly drained soils that formed in lacustrine deposits

Setting

Landform: Lake plains
Slope range: 0 to 2 percent

Composition

Extent of the map unit: 8 percent of the county
Extent of the soils in the map unit:
Del Rey and similar soils—33 percent
Milford and similar soils—23 percent
Minor soils—44 percent

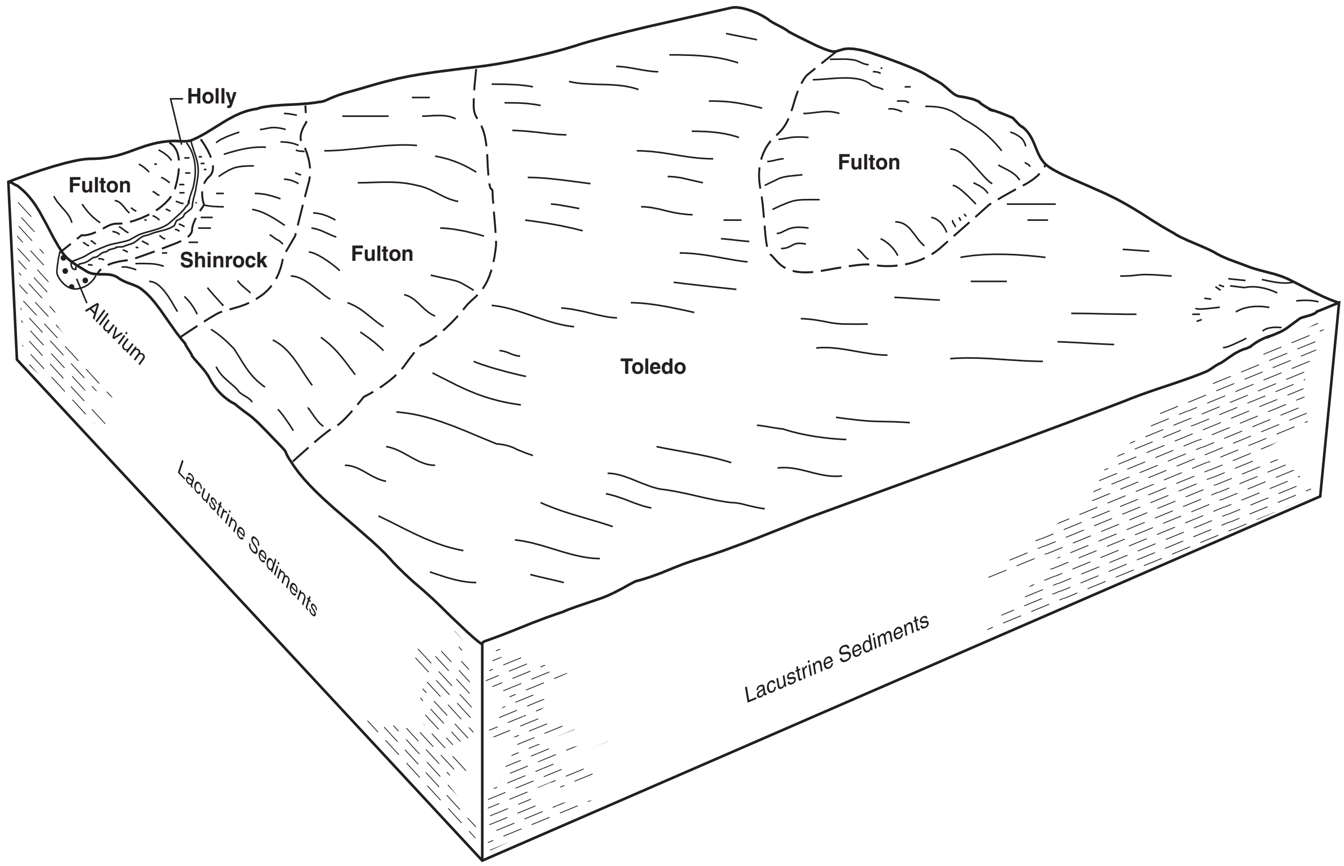


Figure 2.—Typical pattern of soils and parent material in the Toledo-Fulton general soil map unit.

Soil Properties and Qualities

Del Rey

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, slight rises
Parent material: Lacustrine deposits
Texture of the surface layer: Silt loam
Slope range: 0 to 2 percent

Milford

Depth class: Very deep
Drainage class: Poorly drained and very poorly drained
Position on the landform: Extensive flat areas, depressions
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay loam
Slope: 0 to 1 percent

Minor Soils

- The somewhat poorly drained Rimer soils in flat areas and on slight rises
- The moderately well drained Shinrock and Tuscola soils on rises, knolls, and backslopes and on shoulders along drainageways
- The poorly drained and very poorly drained Holly soils and the somewhat poorly drained Orrville soils on flood plains

Use and Management

Major uses: Cropland
Management concerns: Ponding, wetness, tilth, compaction, crusting, moderately slow or slow permeability

3. Weyers-Endoaquents-Sandusky

Very deep, level, very poorly drained soils that formed in calcareous tufa overlying lacustrine deposits or in material altered during surface mining for tufa

Setting

Landform: Lake plains
Slope: 0 to 1 percent

Composition

Extent of the map unit: 2 percent of the county
Extent of the components in the map unit:
Weyers and similar soils—48 percent
Endoaquents and similar soils—21 percent
Sandusky and similar soils—10 percent
Minor components—21 percent

Soil Properties and Qualities

Weyers

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas near spring orifices
Parent material: Calcareous tufa overlying lacustrine deposits
Texture of the surface layer: Silt loam
Slope: 0 to 1 percent

Endoaquents

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas
Parent material: Lacustrine deposits that have been altered by mining or construction activities
Texture of the surface layer: Varies
Slope: 0 to 1 percent

Sandusky

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Flat areas near spring orifices
Parent material: Calcareous tufa overlying lacustrine deposits
Texture of the surface layer: Loam
Slope: 0 to 1 percent

Minor Components

- The somewhat poorly drained Plumbrook soils in flat areas and in slight depressions
- The very poorly drained Toledo soils in extensive flat areas and in depressions
- Areas of water in former borrow pits where the soils have been mined

Use and Management

Major uses: Habitat for wildlife
Management concerns: Wetness, alkalinity, potential ground-water contamination

4. Bennington-Haskins-Cardington

Very deep, nearly level to sloping, somewhat poorly drained and moderately well drained soils that formed in till or loamy deposits overlying till or lacustrine deposits

Setting

Landform: Ground moraines
Slope range: 0 to 12 percent

Composition

Extent of the map unit: 13 percent of the county
Extent of the soils in the map unit:
Bennington and similar soils—30 percent
Haskins and similar soils—13 percent
Cardington and similar soils—10 percent
Minor soils—47 percent

Soil Properties and Qualities

Bennington

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, knolls, slight rises, shoulders, backslopes
Parent material: Till
Texture of the surface layer: Silt loam, loam
Slope range: 0 to 6 percent

Haskins

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, slight rises, footslopes
Parent material: Loamy material overlying till or lacustrine deposits
Texture of the surface layer: Loam
Slope range: 0 to 2 percent

Cardington

Depth class: Very deep
Drainage class: Moderately well drained

Position on the landform: Knolls, shoulders, backslopes, flat areas
Parent material: Till
Texture of the surface layer: Silt loam, silty clay loam
Slope range: 0 to 12 percent

Minor Soils

- The very poorly drained Condit and Mermill soils in depressions and along drainageways
- The somewhat poorly drained, moderately deep Mitiwanga soils in flat areas and on rises, backslopes, and footslopes
- The somewhat poorly drained Orrville soils on flood plains
- The well drained Oshtemo soils on backslopes, shoulders, and summits

Use and Management

Major uses: Cropland
Management concerns: Wetness, erosion, crusting, compaction, tilth, slow or very slow permeability

5. Pewamo-Bennington

Very deep, level to gently sloping, very poorly drained and somewhat poorly drained soils that formed in till or in lacustrine deposits and till

Setting

Landform: Lake plains (fig. 3)
Slope range: 0 to 6 percent

Composition

Extent of the map unit: 11 percent of the county
Extent of the soils in the map unit:
Pewamo and similar soils—56 percent
Bennington and similar soils—19 percent
Minor soils—25 percent

Soil Properties and Qualities

Pewamo

Depth class: Very deep
Drainage class: Very poorly drained

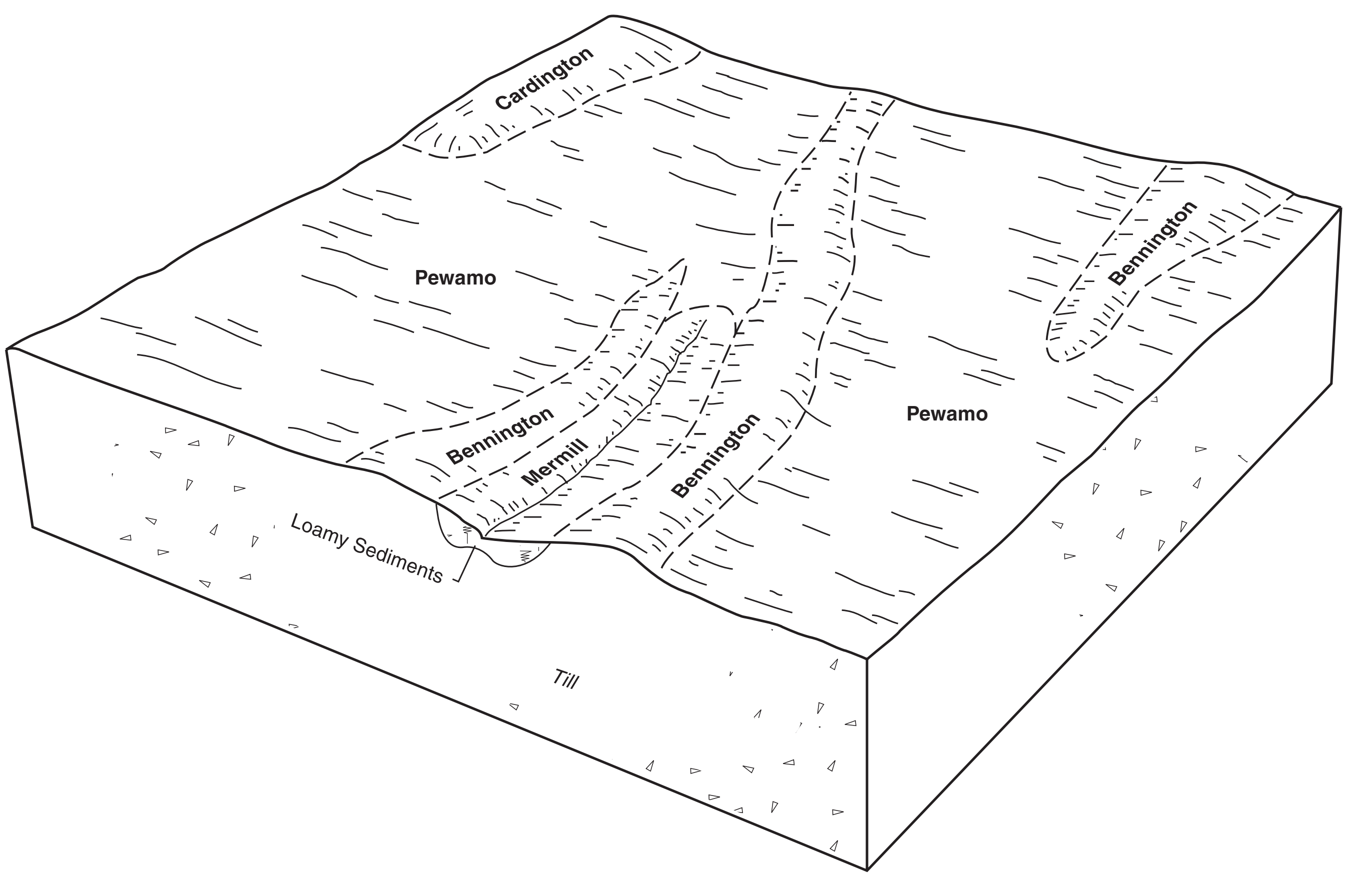


Figure 3.—Typical pattern of soils and parent material in the Pewamo-Bennington general soil map unit.

Position on the landform: Extensive flat areas, drainageways, depressions
Parent material: Till or lacustrine deposits overlying till
Texture of the surface layer: Silty clay loam
Slope: 0 to 1 percent

Bennington

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, slight rises, shoulders, backslopes, knolls
Parent material: Till
Texture of the surface layer: Silt loam, loam
Slope range: 0 to 6 percent

Minor Soils

• The moderately well drained Cardington soils on knolls, backslopes, shoulders, summits, and slight rises and in flat areas
• The somewhat poorly drained Elliott soils in flat areas, on slight rises, and on toeslopes near depressions
• The somewhat poorly drained, moderately deep Hornell soils in flat areas and on rises, backslopes, shoulders, and summits
• The very poorly drained Mermill soils in extensive flat areas, in depressions, and along drainageways

Use and Management

Major uses: Cropland
Management concerns: Ponding, wetness, compaction, crusting, tilth, erosion, slow or moderately slow permeability

6. Mahoning-Ellsworth-Orrville

Very deep, nearly level to sloping, somewhat poorly drained and moderately well drained soils that formed in till and in alluvium overlying sandstone

Setting

Landform: Ground moraines, flood plains
Slope range: 0 to 12 percent

Composition

Extent of the map unit: 1 percent of the county
Extent of the soils in the map unit:
Mahoning and similar soils—26 percent
Ellsworth and similar soils—18 percent
Orrville and similar soils—16 percent
Minor soils—40 percent

Soil Properties and Qualities

Mahoning

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, slight rises, backslopes, shoulders, summits
Parent material: Till
Texture of the surface layer: Silt loam
Slope range: 0 to 6 percent

Ellsworth

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Backslopes, shoulders, summits
Parent material: Till
Texture of the surface layer: Silt loam
Slope range: 2 to 12 percent

Orrville

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas
Parent material: Loamy alluvium overlying sandstone
Texture of the surface layer: Silt loam
Slope range: 0 to 2 percent

Minor Soils

• The well drained Chili and Oshtemo soils on backslopes, shoulders, and summits
• The somewhat poorly drained Jimtown soils in flat areas and on rises
• The moderately well drained Rawson soils on backslopes, shoulders, summits, knolls, and rises and in flat areas

Use and Management

Major uses: Cropland
Management concerns: Wetness, erosion, flooding, crusting, slow or very slow permeability, compaction

7. Allis-Bennington

Moderately deep and very deep, nearly level and gently sloping, poorly drained and somewhat poorly drained soils that formed entirely in till or in till or lacustrine deposits overlying shale

Setting

Landform: Lake plains
Slope range: 0 to 6 percent

Composition

Extent of the map unit: 4 percent of the county
Extent of the soils in the map unit:
Allis and similar soils—59 percent
Bennington and similar soils—10 percent
Minor soils—31 percent

Soil Properties and Qualities

Allis

Depth class: Moderately deep
Drainage class: Poorly drained
Position on the landform: Extensive flat areas, slight rises
Parent material: Till or lacustrine deposits overlying shale
Texture of the surface layer: Clay loam
Slope range: 0 to 2 percent

Bennington

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, slight rises, backslopes, knolls, shoulders
Parent material: Till
Texture of the surface layer: Silt loam, loam
Slope range: 0 to 6 percent

Minor Soils

- The very poorly drained Condit and Fries soils in flat areas and in depressions and drainageways
- The well drained Dekalb soils on backslopes, shoulders, and summits
- The somewhat poorly drained Hornell soils in flat areas and on rises, backslopes, shoulders, and summits
- The somewhat poorly drained Orrville soils on flood plains

Use and Management

Major uses: Woodland, cropland
Management concerns: Wetness, depth to rock, compaction, slow or very slow permeability, erosion, crusting, potential ground-water contamination

8. Hornell-Fries-Colwood, bedrock substratum

Moderately deep and deep, level to gently sloping, somewhat poorly drained to very poorly drained soils that formed in till or lacustrine deposits overlying shale

Setting

Landform: Lake plains
Slope range: 0 to 6 percent

Composition

Extent of the map unit: 6 percent of the county
Extent of the soils in the map unit:
Hornell and similar soils—32 percent
Fries and similar soils—19 percent
Colwood, bedrock substratum, and similar soils—16 percent
Minor soils—33 percent

Soil Properties and Qualities

Hornell

Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, rises, backslopes, shoulders, summits
Parent material: Till or lacustrine deposits overlying shale
Texture of the surface layer: Silty clay loam, loam, silt loam
Slope range: 0 to 6 percent

Fries

Depth class: Moderately deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas, depressions, drainageways
Parent material: Till or lacustrine deposits overlying shale
Texture of the surface layer: Silty clay loam
Slope: 0 or 1 percent

Colwood, bedrock substratum

Depth class: Deep
Drainage class: Very poorly drained and poorly drained

Position on the landform: Extensive flat areas, drainageways, depressions
Parent material: Stratified lacustrine deposits overlying shale
Texture of the surface layer: Silt loam
Slope: 0 to 1 percent

Minor Soils

- The moderately well drained Elnora soils on rises, backslopes, shoulders, and summits
- The very poorly drained Miner soils that have a bedrock substratum and are in flat areas and in drainageways and depressions
- The very poorly drained, very deep Pewamo soils in extensive flat areas and in drainageways and depressions

Use and Management

Major uses: Cropland
Management concerns: Wetness, ponding, compaction, slow or very slow permeability, erosion, potential ground-water contamination, depth to rock, tilth

9. Milton-Millsdale-Castalia

Moderately deep, level to moderately steep, very poorly drained and well drained soils that formed in till, lacustrine deposits, and residuum derived from limestone or dolostone or in beach or eolian deposits intermixed with limestone fragments overlying limestone or dolostone

Setting

Landform: Lake plains, reefs on lake plains
Slope range: 0 to 18 percent

Composition

Extent of the map unit: 14 percent of the county
Extent of the components in the map unit:
Milton and similar soils—23 percent
Millsdale and similar soils—15 percent
Castalia and similar soils—13 percent
Minor components—49 percent

Soil Properties and Qualities

Milton

Depth class: Moderately deep
Drainage class: Well drained
Position on the landform: Flat areas, rises, backslopes, shoulders, summits
Parent material: Till and residuum derived from limestone or dolostone
Texture of the surface layer: Silt loam
Slope range: 0 to 6 percent

Millsdale

Depth class: Moderately deep
Drainage class: Very poorly drained
Position on the landform: Flat areas, drainageways, depressions
Parent material: Till or lacustrine deposits overlying limestone or dolostone
Texture of the surface layer: Silty clay loam
Slope: 0 to 1 percent

Castalia

Depth class: Moderately deep
Drainage class: Well drained
Position on the landform: Flat areas, rises, backslopes, shoulders, summits
Parent material: Beach or eolian deposits intermixed with glacially displaced limestone fragments overlying limestone or dolostone
Texture of the surface layer: Very channery loam
Slope range: 0 to 18 percent

Minor Components

- The somewhat poorly drained, very deep Bennington and Kibbie soils in flat areas and on slight rises
- The well drained Dunbridge soils in flat areas and on slight rises, backslopes, shoulders, and summits
- The very poorly drained, very deep Pewamo soils in depressions and along drainageways
- Quarries where limestone has been removed for local use

Use and Management

Major uses: Cropland, hayland, pasture
Management concerns: Droughtiness, stoniness, erosion, ponding, crusting, depth to rock, rapid to moderately slow permeability, potential ground-water contamination, compaction, crusting

10. Kibbie-Colwood-Elnora

Very deep, level to gently sloping, moderately well drained to very poorly drained soils that formed in lacustrine deposits or glaciofluvial deposits

Setting

Landform: Lake plains, deltas
Slope range: 0 to 4 percent

Composition

Extent of the map unit: 28 percent of the county
Extent of the soils in the map unit:
Kibbie and similar soils—42 percent
Colwood and similar soils—15 percent
Elnora and similar soils—11 percent
Minor soils—32 percent

Soil Properties and Qualities

Kibbie

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Extensive flat areas, slight rises
Parent material: Stratified loamy and silty glaciofluvial deposits
Texture of the surface layer: Fine sandy loam
Slope range: 0 to 2 percent

Colwood

Depth class: Very deep
Drainage class: Very poorly drained and poorly drained
Position on the landform: Extensive flat areas, depressions, drainageways
Parent material: Stratified lacustrine deposits
Texture of the surface layer: Loam
Slope: 0 to 1 percent

Elnora

Depth class: Very deep and deep
Drainage class: Moderately well drained
Position on the landform: Rises, backslopes, shoulders, summits
Parent material: Sandy lacustrine deposits
Texture of the surface layer: Loamy fine sand
Slope range: 0 to 4 percent

Minor Soils

- The somewhat poorly drained Bixler soils in flat areas and on rises, knolls, backslopes, shoulders, and summits
- The somewhat poorly drained Del Rey and Plumbrook soils in flat areas
- The moderately well drained Ogontz and Tuscola soils in flat areas and on slight rises, knolls, backslopes, and shoulders
- The moderately well drained Zurich soils on backslopes and shoulders in dissected areas along streams

Use and Management

Major uses: Cropland
Management concerns: Water and wind erosion, wetness, ponding, droughtiness, rapid permeability, potential ground-water contamination

11. Jimtown-Oshtemo-Millgrove

Very deep, level to gently sloping, somewhat poorly drained, well drained, and very poorly drained soils that formed in loamy deposits, sandy deposits, or beach deposits

Setting

Landform: Lake plains
Slope range: 0 to 6 percent

Composition

Extent of the map unit: 7 percent of the county
Extent of the soils in the map unit:
Jimtown and similar soils—20 percent
Oshtemo and similar soils—16 percent
Millgrove and similar soils—15 percent
Minor soils—49 percent

Soil Properties and Qualities

Jimtown

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, rises, footslopes
Parent material: Loamy deposits
Texture of the surface layer: Loam
Slope range: 0 to 2 percent

Oshtemo

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits

Parent material: Loamy and sandy deposits
Texture of the surface layer: Loamy sand
Slope range: 0 to 6 percent

Millgrove

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Drainageways, depressions
Parent material: Beach deposits
Texture of the surface layer: Loam
Slope: 0 to 1 percent

Minor Soils

- The somewhat poorly drained Bennington soils in flat areas and on slight rises
- The well drained Conotton soils on backslopes, shoulders, and summits
- The well drained, moderately deep Dekalb soils on backslopes, shoulders, and summits
- The moderately well drained Elnora soils on rises, backslopes, shoulders, and summits
- The very poorly drained Miner soils in flat areas and in drainageways and depressions
- The somewhat poorly drained, moderately deep Mitiwanga soils in flat areas and on rises, footslopes, and backslopes

Use and Management

Major uses: Cropland
Management concerns: Wetness, ponding, water and wind erosion, very rapid permeability, droughtiness, potential ground-water contamination

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the county. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called similar, or noncontrasting, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called dissimilar, or contrasting, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Bennington silt loam, 0 to 2 percent slopes, is a phase of the Bennington series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes or associations.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Udipsamments-Spinks complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Amanda-Dekalb-Rock outcrop association, 40 to 70 percent slopes, is an example.

This survey includes *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. The map unit Pits, quarry, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Figure 4 shows the relationship between different geomorphic slope positions and slope terminology. In Erie County, these terms are applied only if slopes are more than 2 percent. More detailed definitions of these landform components are in the Glossary.

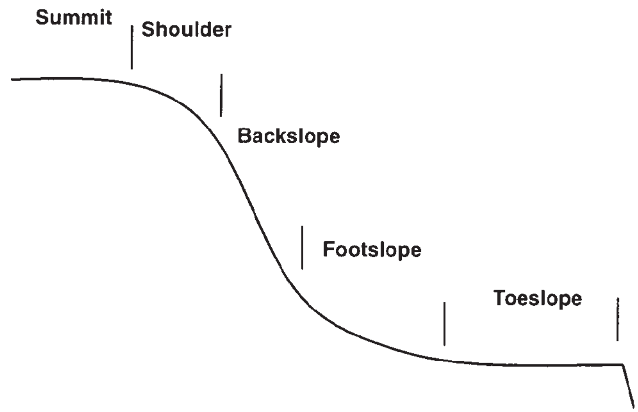


Figure 4.—Diagram showing the relationship between slope position and slope terminology.

AaA—Adrian muck, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Closed depressions
Size of areas: 5 to 25 acres
Note: Subject to ponding

Typical Profile

Surface layer:
0 to 16 inches—black, very friable muck
Subsurface layer:
16 to 28 inches—dark reddish brown, friable sapric material
Substratum:
28 to 80 inches—dark gray and gray, loose loamy sand and sand

Soil Properties and Qualities

Available water capacity: About 13.1 inches to a depth of 60 inches
Cation-exchange capacity: 110 to 150 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by sandy soil material at a depth of 16 to 51 inches
Kind of water table: Apparent
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 55 to 75 percent
Parent material: Organic deposits overlying sandy deposits
Permeability: Moderately slow to moderately rapid in the organic material and rapid in the underlying material
Duration of ponding: Very long
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Muck
Hazard of wind erosion: Severe
Note: This is a hydric soil. The surface layer is subject to oxidation, subsidence, and wind erosion.

Composition

Adrian and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more silt in the substratum
- Soils that have a thinner organic layer

Dissimilar soils:
- Gilford soils near the edges of the mapped areas
- Millgrove soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AeA—Algiers silt loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Fans and toeslopes along depressions
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 11 inches—brown, friable silt loam
Substratum:
11 to 31 inches—brown and dark grayish brown, friable silt loam
Buried surface layer:
31 to 39 inches—black, mottled, firm silty clay loam
Buried subsoil:
39 to 51 inches—dark gray, mottled, firm silty clay loam
Substratum:
51 to 80 inches—gray, mottled, firm and friable silty clay loam and silt loam

Soil Properties and Qualities

Available water capacity: About 10.3 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Depth to the seasonal high water table: 1 to 2 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Alluvium over a buried soil
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Algiers and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Dissimilar soils:
- Very poorly drained soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AkA—Allis clay loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Extensive flat areas, slight rises
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown, friable clay loam
Subsurface layer:
6 to 9 inches—grayish brown, mottled, firm clay loam
Subsoil:
9 to 14 inches—grayish brown, mottled, firm clay loam
14 to 28 inches—grayish brown and gray, mottled, firm clay
Bedrock:
28 to 30 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 3.5 inches to the limiting layer
Cation-exchange capacity: 15 to 32 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep
Root zone: Restricted by shale bedrock at a depth of 20 to 40 inches
Kind of water table: Apparent
Seasonal high water table: Within a depth of 1 foot
Drainage class: Poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till or lacustrine deposits overlying shale
Permeability: Very slow or slow

Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Clay loam
Hazard of wind erosion: Slight
Note: This is a hydric soil.

Composition

Allis and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have bedrock at a depth of 10 to 20 inches
- Soils that have less clay in the subsoil
- Somewhat poorly drained soils

Dissimilar soils:
- Condit soils near the edges of the mapped areas
- Bennington soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AmD2—Amanda loam, 12 to 18 percent slopes, eroded

Setting

Landform: Dissected areas on ground moraines or lake plains
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 20 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, friable loam
Subsoil:
5 to 15 inches—yellowish brown, friable loam
15 to 27 inches—yellowish brown and brown, mottled, firm clay loam
27 to 34 inches—dark yellowish brown, mottled, firm loam
Substratum:
34 to 80 inches—dark yellowish brown, mottled, firm silt loam

Soil Properties and Qualities

Available water capacity: About 8.7 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 34 to 70 inches
Kind of water table: Perched
Depth to the seasonal high water table: 4 to 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Till
Permeability: Moderately slow in the lower part of the subsoil and in the substratum
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Amanda and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have more clay in the subsoil
- Soils that have lacustrine sediments in the substratum

Dissimilar soils:
- Bennington soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

AnG—Amanda-Dekalb-Rock outcrop association, 40 to 70 percent slopes

Setting

Landform: Dissected areas on ground moraines or lake plains
Position on the landform: Backslopes

Size of areas: 20 to 100 acres
Note: Very steep slopes

Typical Profile

Amanda

Surface layer:
0 to 5 inches—brown, friable loam
Subsurface layer:
5 to 12 inches—yellowish brown, friable loam
Subsoil:
12 to 19 inches—yellowish brown, friable loam
19 to 38 inches—yellowish brown, friable and firm clay loam
38 to 52 inches—dark yellowish brown, friable loam
Substratum:
52 to 80 inches—dark yellowish brown, friable loam

Dekalb

Surface layer:
0 to 5 inches—very dark gray, friable very channery loam
Subsoil:
5 to 23 inches—yellowish brown, friable very channery sandy loam and extremely flaggy sandy loam
Bedrock:
23 to 25 inches—fractured, unweathered sandstone

Rock outcrop

The Rock outcrop occurs as vertical escarpments that are 30 to 80 feet high.

Soil Properties and Qualities

Amanda

Available water capacity: About 10 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 40 to 70 inches
Kind of water table: Perched
Depth to the seasonal high water table: 4 to 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till
Permeability: Moderately slow in the lower part of the subsoil and in the substratum
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Dekalb

Available water capacity: About 2.1 inches to the limiting layer
Cation-exchange capacity: 6 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Sandstone residuum
Permeability: Rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Very channery loam
Hazard of wind erosion: Slight

Composition

Amanda and similar soils: 50 percent
Dekalb and similar soils: 25 percent
Rock outcrop: 20 percent
Dissimilar soils: 5 percent

Inclusions

Soils similar to the Dekalb soil:
- Soils that have slopes ranging from 70 to 80 percent
- Soils that have fewer rock fragments in the subsoil than the Dekalb soil

Soils similar to the Amanda soil:
- Soils that have a surface layer of silt loam
- Soils that have more clay in the substratum
- Soils that have a stratified substratum

Components similar to the Rock outcrop:
- Areas of shale outcroppings

Dissimilar soils:
- Jimtown soils on benches

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Bc—Beaches

Setting

Landform: Current beaches along the Lake Erie shoreline
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 50 acres

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Dominant parent material: Recent beach deposits
Note: Other soil properties and qualities vary too much to rate. The map unit is subject to inundation during storm events.

Composition

Beaches: 90 percent
Dissimilar components: 10 percent

Inclusions

Dissimilar components:
- Erosion-control structures constructed along the lake margin

BdB—Belmore loam, 2 to 6 percent slopes

Setting

Landform: Beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 10 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable loam
Subsoil:
9 to 41 inches—yellowish brown and dark yellowish brown, friable loam and clay loam
Substratum:
41 to 60 inches—brown, mottled, friable gravelly loam

Soil Properties and Qualities

Available water capacity: About 7.2 inches to a depth of 60 inches
Cation-exchange capacity: 7 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Loamy deposits overlying stratified loamy, gravelly, and sandy material
Permeability: Moderately rapid in the subsoil and rapid in the substratum
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Belmore and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have fewer rock fragments in the subsoil and substratum
- Soils that have bedrock at a depth of 60 to 80 inches

Dissimilar soils:
- Milton soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BeA—Bennington loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable loam
Subsoil:
10 to 12 inches—yellowish brown, mottled, friable loam
12 to 34 inches—dark yellowish brown, mottled, firm clay loam
Substratum:
34 to 80 inches—brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.9 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 25 to 50 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till
Permeability: Slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Bennington and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Condit soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BgA—Bennington silt loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 10 to 500 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable silt loam
Subsoil:
9 to 11 inches—yellowish brown, mottled, firm silty clay loam
11 to 16 inches—dark yellowish brown, mottled, firm silty clay loam
16 to 29 inches—grayish brown, mottled, firm silty clay and silty clay loam
Substratum:
29 to 36 inches—grayish brown, mottled, firm silty clay loam
36 to 80 inches—yellowish brown and brown, mottled, firm clay loam

Soil Properties and Qualities

Available water capacity: About 7.6 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 25 to 50 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till
Permeability: Slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Bennington and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Moderately well drained soils
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Condit soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BgB—Bennington silt loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Knolls, backslopes, shoulders
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable silt loam
Subsoil:
8 to 32 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam and silty clay
Substratum:
32 to 80 inches—dark yellowish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.7 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 25 to 50 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till
Permeability: Slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Bennington and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Moderately well drained soils
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Condit soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BkA—Bixler loamy fine sand, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, rises, knolls
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, very friable loamy fine sand
Subsurface layer:
10 to 17 inches—yellowish brown, mottled, loose loamy fine sand
17 to 27 inches—yellowish brown, mottled, very friable loamy sand
Subsoil:
27 to 37 inches—dark yellowish brown and brown, mottled, very friable fine sandy loam and friable sandy loam
37 to 44 inches—grayish brown, mottled, firm silt loam with strata of very fine sandy loam
Substratum:
44 to 53 inches—grayish brown, mottled, friable silt loam with strata of fine sandy loam
53 to 80 inches—brown, mottled, very friable loamy fine sand stratified with very fine sandy loam and silt loam

Soil Properties and Qualities

Available water capacity: About 7.2 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches

Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Sandy deposits overlying stratified lacustrine deposits
Permeability: Rapid in the sandy material and moderate in the stratified lacustrine deposits
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Bixler and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have unweathered till at a depth of 60 to 80 inches
- Soils that have thinner sandy layers
- Soils that have a surface layer of sandy loam or fine sandy loam

Dissimilar soils:
- Gilford soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BkB—Bixler loamy fine sand, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Knolls, summits, backslopes, shoulders
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 10 inches—dark brown, very friable loamy fine sand
Subsurface layer:
10 to 26 inches—brown, mottled, very friable loamy fine sand
Subsoil:
26 to 45 inches—gray, mottled, friable silt loam and firm silty clay loam
Substratum:
45 to 80 inches—grayish brown, mottled, friable silt loam with strata of fine sandy loam

Soil Properties and Qualities

Available water capacity: About 7 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Sandy deposits overlying stratified lacustrine deposits
Permeability: Rapid in the sandy material and moderate in the stratified lacustrine deposits
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Bixler and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have till at a depth of 60 to 80 inches
- Soils that have more clay in the substratum

Dissimilar soils:
- Tuscola soils intermingled with areas of the Bixler soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BvG—Brecksville silt loam, 40 to 70 percent slopes

Setting

Landform: Dissected areas on ground moraines or lake plains
Position on the landform: Backslopes
Size of areas: 5 to 50 acres
Note: Very steep slopes

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown, friable silt loam
Subsoil:
5 to 17 inches—brown, friable channery silty clay loam
17 to 24 inches—brown, friable very channery silty clay loam
Bedrock:
24 to 26 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 3.7 inches to the limiting layer
Cation-exchange capacity: 8 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by shale bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Residuum derived from thin-bedded shale
Permeability: Slow
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Brecksville and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Inclusions

Similar soils:
- Soils that have a surface layer of channery silty clay loam
- Soils underlain with sandstone bedrock at a depth of 20 to 40 inches

Dissimilar inclusions:
- Shale outcrops on shoulders
- Soils that have bedrock at a depth of 10 to 20 inches and are near small rock outcrops and on small structural benches
- Zurich soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CaA—Cardington silt loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 20 to 50 acres

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown, friable silt loam
Subsurface layer:
6 to 12 inches—brown, friable silt loam
Subsoil:
12 to 16 inches—brown, friable silt loam
16 to 22 inches—yellowish brown, firm silty clay loam
22 to 34 inches—dark yellowish brown, mottled, firm silty clay and silty clay loam
Substratum:
34 to 80 inches—dark yellowish brown and brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 8.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 28 to 50 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till
Permeability: Slow in the substratum

Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Cardington and similar soils: 100 percent

Inclusions

Similar soils:
- Somewhat poorly drained soils
- Soils that have a surface layer of loam
- Well drained soils
- Soils that have bedrock at a depth of 40 to 80 inches

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

CaB—Cardington silt loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains (fig. 5)
Position on the landform: Knolls, summits, backslopes, shoulders
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam
Subsoil:
9 to 30 inches—brown and dark yellowish brown, mottled, firm silty clay and silty clay loam
Substratum:
30 to 80 inches—dark yellowish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.8 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)

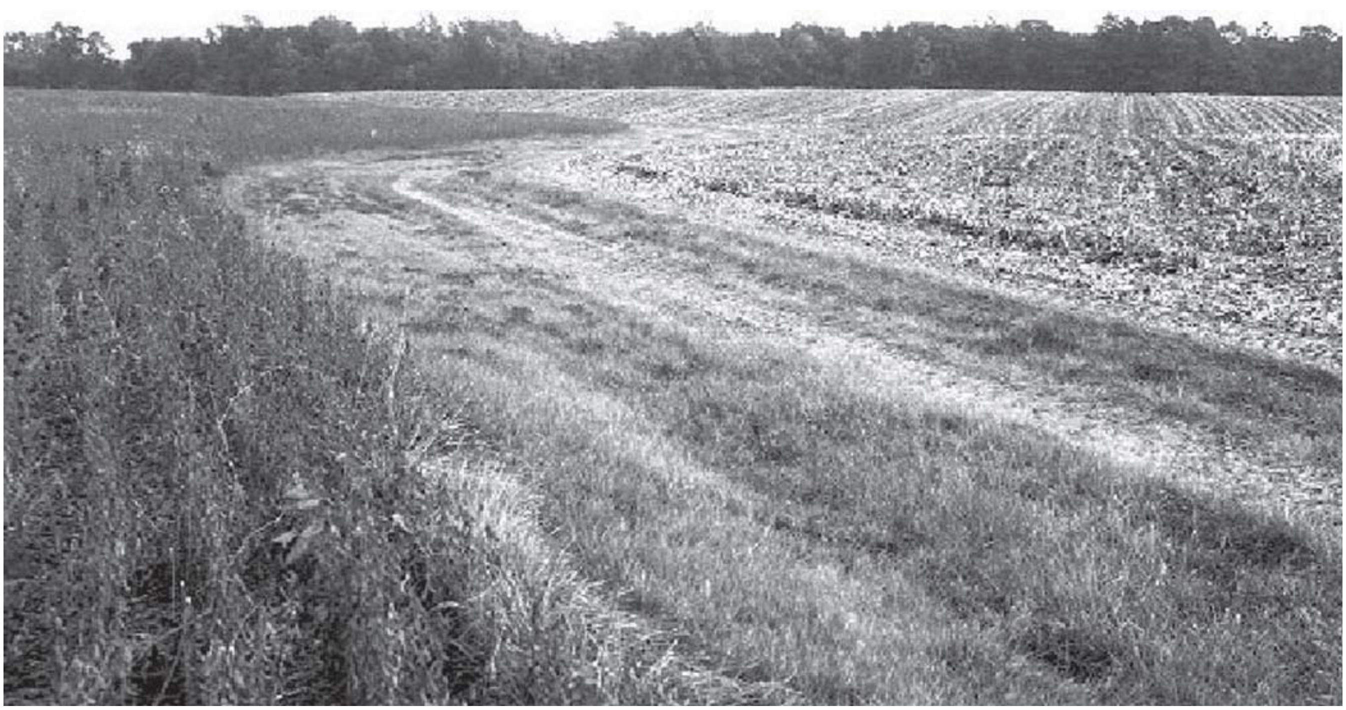


Figure 5.—A well maintained grassed waterway in an area of Cardington silt loam, 2 to 6 percent slopes.

Root zone: Restricted by unweathered till at a depth of 28 to 50 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till
Permeability: Slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Cardington and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Soils that have less clay in the subsoil
- Somewhat poorly drained soils

Dissimilar soils:
- Condit soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CbC2—Cardington silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Dissected areas on ground moraines or lake plains
Position on the landform: Backslopes
Size of areas: 5 to 15 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 6 inches—brown, firm silty clay loam
Subsoil:
6 to 29 inches—brown, mottled, firm silty clay and silty clay loam
Substratum:
29 to 80 inches—brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 28 to 50 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Till
Permeability: Slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Cardington and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Somewhat poorly drained soils
- Soils that have lacustrine deposits in the substratum

Dissimilar soils:
- Condit soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CcA—Castalia very channery loam, 0 to 2 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Flat areas, rises
Size of areas: 5 to 60 acres

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown, friable very channery loam
Subsoil:
8 to 16 inches—brown, friable extremely channery loam
Substratum:
16 to 24 inches—brown, friable extremely flaggy loam
Bedrock:
24 to 26 inches—fractured, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 1.8 inches to the limiting layer
Cation-exchange capacity: 12 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Beach or eolian sediments mixed with glacially displaced limestone fragments overlying limestone or dolostone
Permeability: Rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Very channery loam
Hazard of wind erosion: Slight

Composition

Castalia and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have fewer rock fragments at the surface
- Soils that have bedrock at a depth of 10 to 20 inches

Dissimilar soils:
- Joliet soils in depressions
- Marblehead soils intermingled with areas of the Castalia soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CcB—Castalia very channery loam, 2 to 6 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 8 inches—dark brown, friable very channery loam
Subsoil:
8 to 13 inches—brown, friable very channery silt loam
13 to 24 inches—brown, friable extremely channery loam
Bedrock:
24 to 26 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 1.7 inches to the limiting layer
Cation-exchange capacity: 12 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Beach or eolian sediments mixed with glacially displaced limestone fragments overlying limestone or dolostone (fig. 6)
Permeability: Rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Very channery loam
Hazard of wind erosion: Slight

Figure 6.—Outcrops of limestone bedrock in an area of Castalia very channery loam, 2 to 6 percent slopes.

Composition

Castalia and similar soils: 85 percent
Dissimilar components: 15 percent

Inclusions

Similar soils:
- Soils that have fewer rock fragments at the surface
- Soils that have bedrock at a depth of 10 to 20 inches

Dissimilar components:
- Joliet soils in depressions
- Marblehead soils intermingled with areas of the Castalia soil throughout the map unit
- Areas of rock outcrop throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CcD—Castalia very channery loam, 12 to 18 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown, friable very channery loam

Subsoil:
7 to 16 inches—brown, friable extremely channery loam
Substratum:
16 to 23 inches—brown, friable extremely flaggy loam
Bedrock:
23 to 25 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 1.7 inches to the limiting layer
Cation-exchange capacity: 12 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Beach or eolian sediments mixed with glacially displaced limestone fragments overlying limestone or dolostone
Permeability: Rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Very channery loam
Hazard of wind erosion: Slight

Composition

Castalia and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Inclusions

Similar soils:
• Soils that have bedrock at a depth of 10 to 20 inches or at a depth of 40 to 60 inches
• Soils that have a lighter colored surface layer
Dissimilar inclusions:
• Areas of rock outcrop throughout the map unit
• Marblehead soils near small areas of rock outcrop and on small structural benches

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

ChB—Chili loam, loamy substratum, 2 to 6 percent slopes

Setting

Landform: Beach ridges on lake plains, stream terraces
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable loam
Subsoil:
9 to 14 inches—yellowish brown, friable loam
14 to 23 inches—yellowish brown, friable clay loam
23 to 41 inches—dark yellowish brown and brown, friable gravelly loam and very friable gravelly coarse sandy loam
Substratum:
41 to 77 inches—brown, friable gravelly sandy loam
77 to 80 inches—yellowish brown, mottled, friable loam

Soil Properties and Qualities

Available water capacity: About 6.8 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 13 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Outwash deposits and beach deposits
Permeability: Moderately rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Chili and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
• Soils that have more rock fragments at the surface
• Soils that have less clay in the subsoil
• Moderately well drained soils
Dissimilar soils:
• Jimtown soils near the base of slopes

- Rawson soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CmA—Colwood loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, drainageways, depressions
Size of areas: 10 to 200 acres
Note: Subject to ponding

Typical Profile

Surface layer:
0 to 11 inches—very dark gray, friable loam
Subsoil:
11 to 33 inches—dark gray and grayish brown, mottled, friable loam
33 to 53 inches—grayish brown and gray, mottled, friable silty clay loam and silt loam
Substratum:
53 to 73 inches—grayish brown, mottled, very friable stratified fine sandy loam and loamy fine sand with strata of silt loam
73 to 80 inches—dark grayish brown, loose loamy sand

Soil Properties and Qualities

Available water capacity: About 11.9 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 25 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Kind of water table: Apparent
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Drainage class: Poorly drained and very poorly drained
Content of organic matter in the surface layer: 3 to 8 percent
Parent material: Stratified lacustrine deposits
Permeability: Moderately slow in the subsoil
Duration of ponding: Very brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight
Note: This is a hydric soil.

Composition

Colwood and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have more than 15 percent rock fragments in the substratum
- Soils that have more clay in the substratum

Dissimilar soils:
- Kibbie soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CnA—Colwood silt loam, bedrock substratum, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Size of areas: 30 to 200 acres
Note: Subject to ponding

Typical Profile

Surface layer:
0 to 14 inches—black, friable silt loam
Subsoil:
14 to 27 inches—grayish brown, mottled, friable fine sandy loam
27 to 36 inches—grayish brown, mottled, firm silty clay loam
Substratum:
36 to 47 inches—light brownish gray, mottled, firm silty clay loam

Bedrock:
47 to 49 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 9.1 inches to the limiting layer
Cation-exchange capacity: 10 to 25 milliquivalents per 100 grams in the surface layer
Depth class: Deep (40 to 60 inches)
Root zone: Restricted by shale bedrock at a depth of 40 to 60 inches
Kind of water table: Apparent
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Drainage class: Poorly drained and very poorly drained
Content of organic matter in the surface layer: 3 to 8 percent
Parent material: Stratified lacustrine deposits overlying shale
Permeability: Moderately slow
Duration of ponding: Very brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight
Note: This is a hydric soil.

Composition

Colwood and similar soils: 80 percent
Dissimilar soils: 20 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil
- Soils that have bedrock at a depth of 60 to 80 inches
- Soils that have less clay in the subsoil

Dissimilar soils:
- Fries soils intermingled with areas of the Colwood soil throughout the map unit
- Hornell soils on rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CoA—Condit silt loam, 0 to 1 percent slopes

Setting

Landform: Ground moraines
Position on the landform: Extensive flat areas, drainageways, depressions
Size of areas: 10 to 200 acres
Note: Subject to ponding

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam
Subsoil:
10 to 45 inches—gray, mottled, firm and very firm silty clay loam
Substratum:
45 to 80 inches—gray and yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.8 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Kind of water table: Perched
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till
Permeability: Slow
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight
Note: This is a hydric soil.

Composition

Condit and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have less clay in the subsoil

Dissimilar soils:
- Bennington soils on slight rises
- Undrained areas of Condit soils near the center of depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CtB—Conotton loam, 2 to 6 percent slopes

Setting

Landform: Beach ridges
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable loam
Subsoil:
9 to 11 inches—yellowish brown, friable gravelly loam
11 to 17 inches—brown, friable gravelly loam
17 to 39 inches—brown, friable extremely gravelly sandy loam and very friable gravelly coarse sandy loam
39 to 57 inches—brown, very friable very gravelly loamy coarse sand
Substratum:
57 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities

Available water capacity: About 4.8 inches to a depth of 60 inches
Cation-exchange capacity: 8 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Beach deposits
Permeability: Rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Conotton and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have fewer rock fragments in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches
- Soils that have more rock fragments in the surface layer

Dissimilar soils:
- Jimtown soils near the base of slopes
- Rawson soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

CuC—Conotton gravelly loam, 6 to 12 percent slopes

Setting

Landform: Beach ridges
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable gravelly loam
Subsoil:
8 to 30 inches—dark yellowish brown and brown, friable extremely gravelly sandy loam and extremely gravelly coarse sandy loam
30 to 40 inches—brown, very friable gravelly coarse sandy loam
Substratum:
40 to 80 inches—brown and dark grayish brown, loose gravelly coarse sand and extremely gravelly coarse sand

Soil Properties and Qualities

Available water capacity: About 4.3 inches to a depth of 60 inches

Cation-exchange capacity: 8 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Beach deposits
Permeability: Rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Gravelly loam
Hazard of wind erosion: Slight

Composition

Conotton and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have fewer rock fragments in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Jimtown soils near the base of slopes
- Rawson soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DbB—Dekalb channery loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable channery loam

Subsoil:
9 to 30 inches—yellowish brown, friable very channery loam and very channery sandy loam

Bedrock:
30 to 32 inches—fractured, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 2.8 inches to the limiting layer
Cation-exchange capacity: 6 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Sandstone residuum
Permeability: Rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Channery loam
Hazard of wind erosion: Slight

Composition

Dekalb and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more rock fragments in the surface layer
- Soils that have fewer rock fragments in the subsoil
- Soils that have shale bedrock at a depth of 20 to 40 inches
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Mitiwanga soils near the base of slopes
- Soils that have bedrock at a depth of 10 to 20 inches and are intermingled with areas of the Dekalb soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DbD—Dekalb channery loam, 12 to 18 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Backslopes
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown, friable channery loam
Subsoil:
5 to 21 inches—yellowish brown, friable very channery sandy loam and very flaggy sandy loam
Bedrock:
21 to 23 inches—fractured, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 1.9 inches to the limiting layer
Cation-exchange capacity: 6 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Sandstone residuum
Permeability: Rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Channery loam
Hazard of wind erosion: Slight

Composition

Dekalb and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more rock fragments in the surface layer
- Soils that have fewer rock fragments in the subsoil
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Mitiwanga soils near the base of slopes
- Soils that have bedrock at a depth of 10 to 20 inches and are intermingled with areas of the Dekalb soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

DeA—Del Rey silt loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 11 inches—dark grayish brown, friable silt loam
Subsoil:
11 to 15 inches—brown, mottled, firm silty clay loam
15 to 46 inches—dark yellowish brown, mottled, firm silty clay loam and silty clay
Substratum:
46 to 80 inches—grayish brown, mottled, friable silt loam

Soil Properties and Qualities

Available water capacity: About 9.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1 to 3 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 3 percent
Parent material: Lacustrine deposits
Permeability: Slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Del Rey and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have till at a depth of 60 to 80 inches
- Moderately well drained soils

Dissimilar soils:
- Milford soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

DuA—Dunbridge loamy sand, 0 to 2 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—dark brown, very friable loamy sand
Subsoil:
9 to 13 inches—yellowish brown, very friable loamy sand
13 to 23 inches—yellowish brown, firm loam and clay loam
23 to 29 inches—dark yellowish brown, friable very gravelly loam
Bedrock:
29 to 31 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 3.4 inches to the limiting layer
Cation-exchange capacity: 6 to 13 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Sandy and loamy drift overlying limestone or dolostone
Permeability: Moderately rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loamy sand
Hazard of wind erosion: Severe

Composition

Dunbridge and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Rawson soils intermingled with areas of the Dunbridge soil throughout the map unit
- Oakville soils in the higher landscape positions
- Ritchey soils intermingled with areas of the Dunbridge soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

DuB—Dunbridge loamy sand, 2 to 6 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—dark brown, very friable loamy sand
Subsoil:
9 to 17 inches—yellowish brown, very friable loamy sand
17 to 23 inches—yellowish brown, friable sandy loam

23 to 28 inches—strong brown, friable sandy clay loam
28 to 31 inches—brown, firm clay loam
Bedrock:
31 to 33 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 3.9 inches to the limiting layer
Cation-exchange capacity: 6 to 13 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Sandy and loamy drift overlying limestone or dolostone
Permeability: Moderately rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loamy sand
Hazard of wind erosion: Severe

Composition

Dunbridge and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Rawson soils intermingled with areas of the Dunbridge soil throughout the map unit
- Oakville soils in the higher landscape positions
- Ritchey soils intermingled with areas of the Dunbridge soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

EcA—Elliott silt loam, bedrock substratum, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, slight rises, toeslopes near depressions
Size of areas: 10 to 100 acres
Note: Sinkholes in many areas

Typical Profile

Surface layer:
0 to 11 inches—very dark grayish brown, friable silt loam
Subsoil:
11 to 15 inches—brown, mottled, friable silt loam
15 to 31 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam
31 to 49 inches—dark yellowish brown and brown, mottled, firm clay loam
Substratum:
49 to 65 inches—brown, mottled, firm clay loam
Bedrock:
65 to 67 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 9.9 inches to a depth of 60 inches
Cation-exchange capacity: 20 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (60 to 80 inches)
Root zone: Restricted by unweathered till at a depth of 25 to 50 inches
Depth to the seasonal high water table: 1 to 2 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 3 to 5 percent
Parent material: Till overlying limestone
Permeability: Slow or moderately slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Elliott and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have less clay in the subsoil

• Soils that have a lighter colored surface layer
Dissimilar soils:
• Pewamo soils in depressions
• Soils that have bedrock at a depth of 30 to 40 inches and are intermingled with areas of the Elliott soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

• “Crops and Pasture” section
• “Land Capability Classification” section
• “Recreation” section
• “Wildlife Habitat” section
• “Engineering” and “Soil Properties” sections

EdB—Ellsworth silt loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines
Position on the landform: Backslopes, shoulders, summits
Size of areas: 2 to 20 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silt loam
Subsoil:
8 to 30 inches—strong brown, dark yellowish brown, and brown, mottled, firm silty clay loam and silty clay
Substratum:
30 to 80 inches—brown and dark yellowish brown, mottled, firm clay loam

Soil Properties and Qualities

Available water capacity: About 7.3 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 28 to 46 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till
Permeability: Very slow or slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Ellsworth and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
• Soils that have a surface layer of loam
• Soils that have less clay in the subsoil
• Somewhat poorly drained soils
• Eroded soils that have surface layer of silty clay loam
Dissimilar soils:
• Condit soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

• “Crops and Pasture” section
• “Land Capability Classification” section
• “Woodland” section
• “Recreation” section
• “Wildlife Habitat” section
• “Engineering” and “Soil Properties” sections

EdC2—Ellsworth silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Ground moraines
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 10 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, friable silt loam
Subsoil:
7 to 44 inches—dark yellowish brown and yellowish brown, mottled, firm clay loam and silty clay loam
Substratum:
44 to 80 inches—dark yellowish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 8.1 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 22 milliquivalents per 100 grams in the surface layer

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 28 to 46 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Till
Permeability: Very slow or slow in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Ellsworth and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that are stratified in the substratum
- Soils that have less clay in the subsoil
- Somewhat poorly drained soils
- Soils that have a surface layer of loam

Dissimilar soils:
- Condit soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

EnA—Elnora loamy fine sand, 0 to 4 percent slopes

Setting

Landform: Lake plains
Position on the landform: Rises, summits, backslopes, shoulders
Size of areas: 5 to 500 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, very friable loamy fine sand
Subsoil:
10 to 31 inches—yellowish brown, mottled, very friable loamy fine sand
Substratum:
31 to 80 inches—light brownish gray, gray, and dark grayish brown, mottled, loose loamy fine sand

Soil Properties and Qualities

Available water capacity: About 4.3 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 2.0 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Sandy lacustrine deposits
Permeability: Rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe (fig. 7)

Composition

Elnora and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of fine sandy loam
- Somewhat poorly drained soils
- Soils that have more clay in the substratum
- Well drained soils

Dissimilar soils:
- Plumbrook soils in slight depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Figure 7.—Wind erosion is a hazard in areas of the Elnora soil, in the foreground, and the Spinks soils, in the background. Windbreaks and cover crops help to minimize the damage to crops and the loss of topsoil.

EoA—Elnora loamy fine sand, bedrock substratum, 0 to 4 percent slopes

Setting

Landform: Lake plains
Position on the landform: Rises, summits, backslopes, shoulders
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 14 inches—dark grayish brown and very dark grayish brown, very friable loamy fine sand
Subsoil:
14 to 31 inches—light yellowish brown and pale brown, mottled, very friable loamy fine sand
Substratum:
31 to 45 inches—light brownish gray, mottled, loose fine sand
45 to 55 inches—gray, very friable very channery fine sandy loam
Bedrock:
55 to 57 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 4.6 inches to the limiting layer
Cation-exchange capacity: 5 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Deep (40 to 60 inches)
Root zone: Restricted by shale bedrock at a depth of 40 to 60 inches
Depth to the seasonal high water table: 1.5 to 2.0 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Sandy lacustrine deposits overlying shale
Permeability: Rapid or moderately rapid in the substratum

Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Elnora and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Somewhat poorly drained soils
- Soils that have more clay in the substratum
- Soils that have a darker surface layer
- Soils that have bedrock at a depth of 60 to 80 inches

Dissimilar soils:
- Hornell soils in the lower landscape positions
- Plumbrook soils in the flatter landscape positions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

EsA—Endoaquents, loamy, 0 to 1 percent slopes

Setting

Landform: Lake plains
Size of areas: 25 to 500 acres
Note: These are hydric soils. They are subject to ponding during wet periods. The shallow pits are the result of surface mining for tufa.

Typical Profile

0 to 80 inches—dark gray and gray, mottled, friable silt loam, silty clay loam, and fine sandy loam

Soil Properties and Qualities

Available water capacity: Varies
Cation-exchange capacity: Varies
Depth class: Very deep (more than 80 inches)
Root zone: Varies
Seasonal high water table: 2 feet above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: Varies
Parent material: Lacustrine deposits altered during surface mining for tufa
Permeability: Varies
Duration of ponding: Very long
Potential for frost action: Varies
Shrink-swell potential: Varies
Texture of the surface layer: Varies
Hazard of wind erosion: Varies

Composition

Endoaquents and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Inclusions

Similar soils:
- Soils that are in the slightly higher landscape positions and are not subject to ponding

Dissimilar inclusions:
- Bodies of water that are less than 2 acres in size

Management

For general information about managing this map unit, see the following sections and their corresponding tables:

- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

FnA—Fluvaquents, silty, 0 to 1 percent slopes, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas
Size of areas: 5 to 50 acres
Note: These are hydric soils. They are subject to ponding and are inundated by floodwater for extended periods.

Typical Profile

0 to 80 inches—dark gray and gray, friable silt loam and silty clay loam with strata of very fine sandy loam

Soil Properties and Qualities

Available water capacity: Varies
Cation-exchange capacity: Varies
Depth class: Very deep (more than 80 inches)
Root zone: Varies
Seasonal high water table: 2 feet above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained

Flooding: Frequent
Duration of flooding: Very long
Content of organic matter in the surface layer: Varies
Parent material: Alluvium
Permeability: Varies
Duration of ponding: Very long
Potential for frost action: Varies
Shrink-swell potential: Varies
Texture of the surface layer: Varies
Hazard of wind erosion: Varies

Composition

Fluvaquents and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Dissimilar soils:
• Better drained soils that are on slight rises and are not subject to frequent flooding

Management

For general information about managing this map unit, see the following sections and their corresponding tables:

- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

FoB—Fox loam, 2 to 6 percent slopes

Setting

Landform: Beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown, friable loam
Subsoil:
5 to 11 inches—brown, friable sandy loam
11 to 18 inches—yellowish brown, friable loam
18 to 28 inches—dark yellowish brown and brown, firm clay loam
28 to 32 inches—dark brown, friable very gravelly sandy loam
Substratum:
32 to 80 inches—yellowish brown and light gray, loose very gravelly sand and very cobbly sand

Soil Properties and Qualities

Available water capacity: About 6.1 inches to a depth of 60 inches
Cation-exchange capacity: 4 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by sand and gravel at a depth of 24 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Beach deposits
Permeability: Moderate in the subsoil and rapid or very rapid in the subsoil
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Fox and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
• Soils that have a darker surface layer
• Soils that have more rock fragments in the surface layer
• Soils that have less clay in the subsoil
• Soils that have sand and gravel at a depth of 10 to 24 inches
Dissimilar soils:
• Castalia soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

FrA—Fries silty clay loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions, drainageways
Size of areas: 10 to 200 acres
Note: This is a hydric soil.

Typical Profile

Surface layer:
0 to 10 inches—black, firm silty clay loam
Subsurface layer:
10 to 14 inches—very dark gray, mottled, very firm silty clay
Subsoil:
14 to 28 inches—grayish brown and yellowish brown, mottled, very firm clay and clay loam
Bedrock:
28 to 30 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 4.2 inches to the limiting layer
Cation-exchange capacity: 21 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by shale bedrock at a depth of 20 to 40 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 4 to 8 percent
Parent material: Till or lacustrine deposits overlying shale
Permeability: Slow
Duration of ponding: Brief
Potential for frost action: Moderate
Shrink-swell potential: High
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Fries and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have a lighter colored surface layer
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Hornell soils on rises
- Pewamo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

FuA—Fulton silty clay loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, flat areas
Size of areas: 10 to 300 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, firm silty clay loam
Subsoil:
9 to 29 inches—yellowish brown and dark yellowish brown, mottled very firm clay and firm silty clay
29 to 47 inches—dark yellowish brown, mottled, firm silty clay
Substratum:
47 to 80 inches—dark yellowish brown, mottled, firm silty clay

Soil Properties and Qualities

Available water capacity: About 7.3 inches to a depth of 60 inches
Cation-exchange capacity: 22 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 3 percent
Parent material: Lacustrine deposits
Permeability: Very slow or slow in the substratum
Potential for frost action: Moderate
Shrink-swell potential: High
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Fulton and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil or in the substratum, or both
- Moderately well drained soils

Dissimilar soils:
- Toledo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

GdA—Gilford fine sandy loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Size of areas: 20 to 500 acres
Note: This soil is subject to ponding.

Typical Profile

Surface layer:
0 to 9 inches—black, friable fine sandy loam
Subsurface layer:
9 to 12 inches—very dark grayish brown, friable fine sandy loam
Subsoil:
12 to 32 inches—dark gray and gray, mottled, friable fine sandy loam
32 to 44 inches—grayish brown, mottled, very friable loamy fine sand
Substratum:
44 to 58 inches—dark grayish brown, mottled, loose loamy fine sand
58 to 80 inches—dark gray, loose loamy fine sand and sand

Soil Properties and Qualities

Available water capacity: About 6.7 inches to a depth of 60 inches
Cation-exchange capacity: 8 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 0.5 foot above the surface to 1.0 foot below the surface
Kind of water table: Apparent
Drainage class: Poorly drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Loamy and sandy deposits
Permeability: Rapid in the lower part of the subsoil and in the substratum
Duration of ponding: Very brief
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Fine sandy loam
Hazard of wind erosion: Moderate

Composition

Gilford and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil
- Soils that have more silt in the substratum
- Soils that have a surface layer of loamy fine sand

Dissimilar soils:
- Plumbrook soils in the slightly higher areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HdA—Harrod silt loam, 0 to 1 percent slopes, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silt loam
Subsurface layer:
9 to 13 inches—very dark grayish brown, friable silt loam
Subsoil:
13 to 17 inches—brown, mottled, friable silt loam

17 to 28 inches—grayish brown, mottled, firm clay loam
28 to 33 inches—grayish brown, mottled, friable loam
Bedrock:
33 to 35 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 5.5 inches to the limiting layer
Cation-exchange capacity: 13 to 28 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 1 to 2 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Flooding: Frequent
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Alluvium overlying limestone
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Harrod and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Somewhat poorly drained soils
- Soils that have a lighter colored surface layer
- Soils that have more clay in the subsoil
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Very poorly drained soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HkA—Haskins loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, slight rises, footslopes
Size of areas: 5 to 150 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable loam
Subsoil:
10 to 14 inches—yellowish brown, mottled, friable loam
14 to 32 inches—grayish brown and dark yellowish brown, mottled, friable and firm loam
Substratum:
32 to 52 inches—brown, mottled, firm clay loam
52 to 80 inches—dark yellowish brown, very firm clay loam

Soil Properties and Qualities

Available water capacity: About 7.3 inches to a depth of 60 inches
Cation-exchange capacity: 6 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till or lacustrine deposits at a depth of 25 to 55 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Permeability: Moderate in the loamy subsoil and very slow or slow in the lower part of the subsoil and in the substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Haskins and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more clay or sand in the subsoil
- Soils that have a surface layer of sandy loam or fine sandy loam

- Moderately well drained soils
- Soils that have a darker surface layer
- Soils that have till or lacustrine deposits at a depth of 40 to 60 inches

Dissimilar soils:
- Mermill soils in depressions
- Very poorly drained soils that have till at a depth of 40 to 60 inches

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HoA—Holly silt loam, 0 to 1 percent slopes, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas, depressions, abandoned stream meanders
Size of areas: 10 to 200 acres
Note: This is a hydric soil.

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable silt loam
Subsoil:
8 to 30 inches—dark gray and gray, mottled, friable silt loam and silty clay loam
Substratum:
30 to 80 inches—grayish brown, strong brown, and light brownish gray, mottled, friable loam and sandy loam

Soil Properties and Qualities

Available water capacity: About 10.4 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 24 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: Within a depth of 1 foot
Kind of water table: Apparent
Drainage class: Very poorly and poorly drained
Flooding: Occasional
Content of organic matter in the surface layer: 2 to 5 percent
Parent material: Alluvium
Permeability: Moderate or moderately slow in the subsoil and moderate or moderately rapid in the substratum
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Holly and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have till at a depth of 60 to 80 inches

Dissimilar soils:
- Orrville soils on slight rises
- Undrained areas of Holly soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HpB—Hornell loam, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Rises, summits, backslopes, shoulders
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, friable loam
Subsoil:
7 to 10 inches—brown, mottled, firm silty clay loam
10 to 30 inches—gray, mottled, firm silty clay loam and silty clay

Bedrock:
30 to 32 inches—soft, weathered shale

Soil Properties and Qualities

Available water capacity: About 4.1 inches to the limiting layer
Cation-exchange capacity: 10 to 35 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by shale bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till or lacustrine deposits overlying shale
Permeability: Very slow or slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Hornell and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have more rock fragments in the subsoil
- Soils that have less clay in the subsoil

Dissimilar soils:
- Fries soils in depressions
- Soils that have bedrock at a depth of 10 to 20 inches and are intermingled with areas of the Hornell soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HrB—Hornell silt loam, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Rises, summits, backslopes, shoulders
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silt loam
Subsoil:
8 to 13 inches—yellowish brown, mottled, firm silty clay loam
13 to 32 inches—gray, mottled, firm channery silty clay and silty clay
Bedrock:
32 to 34 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 3.7 inches to the limiting layer
Cation-exchange capacity: 10 to 35 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by shale bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till or lacustrine deposits overlying shale
Permeability: Very slow or slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Hornell and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more rock fragments in the subsoil
- Moderately well drained soils
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
• Fries soils in depressions
• Soils that have bedrock at a depth of 10 to 20 inches and are intermingled with areas of the Hornell soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HsA—Hornell silty clay loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, rises
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 12 inches—dark grayish brown, friable silty clay loam
Subsoil:
12 to 19 inches—pale brown, mottled, firm silty clay loam
19 to 24 inches—light brownish gray, mottled, friable channery silty clay loam
Bedrock:
24 to 26 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 3.6 inches to the limiting layer
Cation-exchange capacity: 10 to 35 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by shale bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till or lacustrine deposits overlying shale
Permeability: Very slow or slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Hornell and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
• Soils that have more rock fragments in the subsoil
• Soils that have less clay in the subsoil
• Soils that have bedrock at a depth of 40 to 60 inches
Dissimilar soils:
• Fries soils in depressions
• Soils that have bedrock at a depth of 10 to 20 inches and are intermingled with areas of the Hornell soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

JtA—Jimtown loam, 0 to 2 percent slopes

Setting

Landform: Beach ridges, lake plains, stream terraces
Position on the landform: Flat areas, rises, footslopes
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable loam
Subsoil:
9 to 14 inches—brown, mottled, friable loam
14 to 27 inches—light brownish gray, mottled, friable clay loam
27 to 51 inches—brown, mottled, friable gravelly sandy loam with pockets of loam
Substratum:
51 to 65 inches—dark grayish brown, mottled, friable stratified loam, gravelly loam, and coarse sandy loam

65 to 80 inches—dark grayish brown, mottled, very friable coarse sandy loam

Soil Properties and Qualities

Available water capacity: About 7.1 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 18 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 3 percent
Parent material: Loamy deposits
Permeability: Moderate in the upper part of the subsoil, moderate or moderately rapid in the lower part of the subsoil, and moderately rapid in the substratum
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Jimtown and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have less clay in the subsoil
- Soils that have till or lacustrine deposits at a depth of 40 to 80 inches

Dissimilar soils:
- Millgrove soils in depressions and drainageways
- Very poorly drained soils that have till at a depth of 40 to 60 inches and are in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

JuA—Joliet silt loam, 0 to 1 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Flat areas, depressions, drainageways
Size of areas: 10 to 50 acres
Note: This is a hydric soil.

Typical Profile

Surface layer:
0 to 8 inches—black, mottled, friable silt loam
Subsoil:
8 to 14 inches—dark grayish brown, friable silt loam
Bedrock:
14 to 16 inches—fractured, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 3 inches to the limiting layer
Cation-exchange capacity: 18 to 26 milliquivalents per 100 grams in the surface layer
Depth class: Shallow (10 to 20 inches)
Root zone: Restricted by limestone bedrock at a depth of 10 to 20 inches
Seasonal high water table: Within a depth of 1 foot
Kind of water table: Apparent
Drainage class: Poorly drained
Content of organic matter in the surface layer: 4 to 5 percent
Parent material: Loamy drift overlying limestone
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Joliet and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more rock fragments throughout
- Soils that have more clay in the subsoil
- Somewhat poorly drained soils

Dissimilar soils:
- Ritchey soils on knolls
- Millsdale soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

KbA—Kibbie fine sandy loam, 0 to 2 percent slopes

Setting

Landform: Lake plains, deltas
Position on the landform: Extensive flat areas, slight rises
Size of areas: 20 to 500 acres

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable fine sandy loam
Subsoil:
9 to 26 inches—yellowish brown, mottled, friable silty clay loam and loam with pockets of fine sandy loam
26 to 42 inches—yellowish brown and grayish brown, mottled, friable silty clay loam and silt loam
Substratum:
42 to 80 inches—grayish brown, mottled, friable silt loam with strata of fine sandy loam

Soil Properties and Qualities

Available water capacity: About 11.3 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1 to 2 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Stratified loamy and silty glaciofluvial deposits
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Fine sandy loam
Hazard of wind erosion: Moderate

Composition

Kibbie and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Soils that have a thicker surface layer
- Soils that have a lighter colored surface layer
- Moderately well drained soils

Dissimilar soils:
- Colwood soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MaA—Mahoning silt loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines
Position on the landform: Flat areas, slight rises, summits
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam
Subsoil:
9 to 11 inches—yellowish brown, mottled, friable silt loam
11 to 40 inches—yellowish brown, mottled, firm silty clay loam
Substratum:
40 to 80 inches—yellowish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 8.1 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)

Root zone: Restricted by unweathered till at a depth of 28 to 44 inches
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till
Permeability: Very slow or slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Mahoning and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Condit soils in depressions and drainageways
- Miner soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MaB—Mahoning silt loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines
Position on the landform: Backslopes, shoulders
Size of areas: 2 to 20 acres

Typical Profile

Surface layer:
0 to 8 inches—dark brown, friable silt loam
Subsoil:
8 to 11 inches—yellowish brown, mottled, friable silt loam
11 to 31 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam and clay
Substratum:
31 to 80 inches—brown, firm silty clay loam and clay loam

Soil Properties and Qualities

Available water capacity: About 7.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 28 to 44 inches
Depth to the seasonal high water table: 0.5 foot to 1.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till
Permeability: Very slow or slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Mahoning and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Moderately well drained soils
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Condit soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MbB—Marblehead loam, 0 to 6 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Rises, summits, backslopes, shoulders
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 6 inches—black, friable loam
Subsurface layer:
6 to 8 inches—very dark grayish brown, friable gravelly loam
Bedrock:
8 to 10 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 1.3 inches to the limiting layer
Cation-exchange capacity: 0 to 7 milliquivalents per 100 grams in the surface layer
Depth class: Very shallow (4 to 10 inches)
Root zone: Restricted by limestone bedrock at a depth of 4 to 10 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Somewhat excessively drained
Content of organic matter in the surface layer: 3 to 8 percent
Parent material: Loamy deposits overlying limestone or dolostone
Permeability: Moderate
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Marblehead and similar soils: 80 percent
Dissimilar inclusions: 20 percent

Inclusions

Similar soils:
• Soils that have more rock fragments in the surface layer
• Soils that have bedrock at a depth of 10 to 20 inches
Dissimilar inclusions:
• Joliet soils in depressions
• Castalia soils intermingled with areas of the Marblehead soil throughout the map unit
• Rock outcrop intermingled with areas of the Marblehead soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MeA—Mermill silty clay loam, 0 to 1 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Extensive flat areas, depressions, drainageways
Size of areas: 50 to 300 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 10 inches—black, mottled, friable silty clay loam
Subsoil:
10 to 13 inches—dark grayish brown, mottled, friable silty clay loam
13 to 24 inches—grayish brown, mottled, friable clay loam and loam
24 to 41 inches—gray, mottled, firm silty clay and silty clay loam
Substratum:
41 to 80 inches—dark grayish brown and grayish brown, mottled, firm silty clay and clay loam

Soil Properties and Qualities

Available water capacity: About 6.9 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 26 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till or lacustrine deposits at a depth of 24 to 48 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface

Kind of water table: Perched
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Permeability: Moderate in the loamy material and very slow or slow in the substratum
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Mermill and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a thinner surface layer
- Soils that have a surface layer of loam
- Soils that have till or lacustrine deposits at a depth of 40 to 80 inches
- Soils that have more clay in the subsoil

Dissimilar soils:
- Haskins soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MfA—Milford silty clay loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Size of areas: 20 to 500 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 10 inches—black, friable silty clay loam
Subsoil:
10 to 54 inches—grayish brown and gray, mottled, firm silty clay loam and silty clay
Substratum:
54 to 80 inches—gray, mottled, firm silty clay loam with strata of silt loam

Soil Properties and Qualities

Available water capacity: About 11.8 inches to a depth of 60 inches
Cation-exchange capacity: 24 to 36 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 0.5 foot above the surface to 2.0 feet below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained and poorly drained
Content of organic matter in the surface layer: 5 to 6 percent
Parent material: Lacustrine deposits
Permeability: Moderately slow
Ponding: Very brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Milford and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have more clay throughout
- Soils that have more sand in the subsoil
- Soils that have a thinner surface layer
- Soils that have till below a depth of 40 inches

Dissimilar soils:
- Del Rey soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MgA—Millgrove loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Depressions, drainageways
Size of areas: 10 to 300 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 8 inches—very dark gray, friable loam
Subsurface layer:
8 to 13 inches—very dark gray, mottled, friable loam
Subsoil:
13 to 18 inches—dark gray, mottled, friable clay loam
18 to 41 inches—gray, mottled, friable clay loam
Substratum:
41 to 73 inches—gray and dark gray, mottled, friable loam and gravelly coarse sandy loam
73 to 80 inches—gray, mottled, friable fine sandy loam and dark gray, friable very fine sandy loam

Soil Properties and Qualities

Available water capacity: About 8.8 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 8 percent
Parent material: Beach deposits
Permeability: Moderate or moderately rapid in the substratum
Duration of ponding: Very brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Millgrove and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have fewer rock fragments throughout
- Soils that have till below a depth of 40 inches

Dissimilar soils:
- Haskins soils on slight rises
- Jimtown soils on rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MmA—Millsdale silty clay loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, drainageways, depressions
Size of areas: 20 to 400 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 10 inches—very dark gray, friable silty clay loam
Subsoil:
10 to 33 inches—gray and grayish brown, mottled, firm silty clay loam
Bedrock:
33 to 35 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 4.8 inches to the limiting layer
Cation-exchange capacity: 20 to 36 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 4 to 7 percent
Parent material: Till or lacustrine deposits overlying limestone or dolostone
Permeability: Moderately slow
Duration of ponding: Very brief
Potential for frost action: High

Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Millsdale and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Joliet soils intermingled with areas of the Millsdale soil throughout the map unit
- Randolph soils on slight rises
- Pewamo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MnA—Milton silt loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, rises
Size of areas: 20 to 400 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable silt loam
Subsoil:
8 to 10 inches—yellowish brown, friable silt loam
10 to 15 inches—yellowish brown, firm silty clay loam
15 to 28 inches—dark yellowish brown and brown, firm silty clay
Bedrock:
28 to 30 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 4.7 inches to the limiting layer
Cation-exchange capacity: 10 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till and residuum derived from limestone or dolostone
Permeability: Moderate or moderately slow
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Milton and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a surface layer of loam

Dissimilar soils:
- Randolph soils in concave areas
- Ritchey soils intermingled with areas of the Milton soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MnB—Milton silt loam, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, friable silt loam

Subsoil:
10 to 13 inches—brown, friable silt loam
13 to 27 inches—brown, reddish brown, and strong brown, firm clay loam
Bedrock:
27 to 29 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 4.9 inches to the limiting layer
Cation-exchange capacity: 10 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till and residuum derived from limestone or dolostone
Permeability: Moderate or moderately slow
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Milton and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have a surface layer of loam
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Cardington soils on shoulders
- Ritchey soils intermingled with areas of the Milton soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MrA—Miner silty clay loam, 0 to 1 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Depressions, drainageways
Size of areas: 10 to 100 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silty clay loam
Subsoil:
9 to 34 inches—dark gray and gray, mottled, firm clay loam and silty clay loam
34 to 53 inches—brown, mottled, firm silty clay loam
Substratum:
53 to 65 inches—grayish brown, mottled, firm clay loam
65 to 80 inches—brown, mottled, firm channery clay loam

Soil Properties and Qualities

Available water capacity: About 8 inches to a depth of 60 inches
Cation-exchange capacity: 20 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Perched
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Till mostly derived from shale
Permeability: Slow
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Miner and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have a lighter colored surface layer

Dissimilar soils:
- Bennington soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MsA—Miner silt loam, bedrock substratum, 0 to 1 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, depressions
Size of areas: 10 to 100 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silt loam
Subsoil:
9 to 40 inches—dark gray and gray, mottled, firm silty clay loam and silty clay
40 to 52 inches—strong brown, mottled, firm silty clay
Substratum:
52 to 59 inches—strong brown, mottled, firm channery silty clay
Bedrock:
59 to 61 inches—weathered shale

Soil Properties and Qualities

Available water capacity: About 6.5 inches to the limiting layer
Cation-exchange capacity: 17 to 25 milliquivalents per 100 grams in the surface layer
Depth class: Deep (40 to 60 inches)
Root zone: Restricted by shale bedrock at a depth of 40 to 60 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Perched
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Till mostly derived from shale overlying shale
Permeability: Slow
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Miner and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have a thicker surface layer
- Soils that have bedrock at a depth of 60 to 80 inches

Dissimilar soils:
- Fries soils in depressions
- Hornell soils on rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

MxA—Mitiwanga silt loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, footslopes
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam
Subsoil:
9 to 11 inches—yellowish brown, mottled, friable silt loam
11 to 25 inches—yellowish brown, mottled, firm clay loam
Bedrock:
25 to 27 inches—hard, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 4.2 inches to the limiting layer
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till overlying sandstone
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Mitiwanga and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil
- Soils that have a surface layer of loam

Dissimilar soils:
- Bennington and Jimtown soils near the edges of the mapped areas
- Wakeman soils in the higher landscape positions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

MxB—Mitiwanga silt loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Rises, backslopes
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 13 inches—dark grayish brown, friable silt loam
Subsoil:
13 to 30 inches—brown, mottled, firm clay loam
Bedrock:
30 to 32 inches—hard, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 5 inches to the limiting layer
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Till overlying sandstone
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Mitiwanga and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Soils that have bedrock at a depth of 40 to 60 inches

Dissimilar soils:
- Bennington and Haskins soils near the edges of the mapped areas
- Wakeman soils in the higher landscape positions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

NoA—Nolin silt loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas, areas adjacent to stream channels
Size of areas: 10 to 150 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam
Subsoil:
10 to 47 inches—brown, friable silt loam
Substratum:
47 to 80 inches—brown, mottled, friable silt loam

Soil Properties and Qualities

Available water capacity: About 12 inches to a depth of 60 inches
Cation-exchange capacity: 6 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 3 to 6 feet
Kind of water table: Apparent
Drainage class: Well drained
Flooding: Occasional
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Alluvium
Permeability: Moderate in the subsoil
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Nolin and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have a darker surface layer
- Soils that have more sand throughout

Dissimilar soils:
- Holly soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:
- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OaB—Oakville loamy fine sand, 0 to 6 percent slopes

Setting

Landform: Dunes and beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, very friable loamy fine sand
Subsoil:
9 to 26 inches—brownish yellow, very friable loamy fine sand
Substratum:
26 to 80 inches—light yellowish brown and yellowish brown, mottled, loose loamy fine sand

Soil Properties and Qualities

Available water capacity: About 4.4 inches to a depth of 60 inches
Cation-exchange capacity: 2 to 10 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Sandy deposits
Permeability: Rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Oakville and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have lamellae with more clay in the subsoil

- Soils that have bedrock at a depth of 40 to 80 inches
- Moderately well drained soils

Dissimilar soils:
- Bixler soils in the flatter landscape positions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OgA—Ogontz fine sandy loam, 0 to 2 percent slopes

Setting

Landform: Lake plains, deltas
Position on the landform: Flat areas, slight rises
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable fine sandy loam
Subsoil:
10 to 12 inches—yellowish brown, mottled, friable loam
12 to 17 inches—yellowish brown, mottled, friable silt loam
17 to 36 inches—dark yellowish brown and brown, mottled, firm silty clay loam and friable silt loam
Substratum:
36 to 80 inches—brown, mottled, friable silt loam with strata of silty clay loam and very fine sandy loam

Soil Properties and Qualities

Available water capacity: About 9.1 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 17 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Stratified lacustrine deposits
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Fine sandy loam
Hazard of wind erosion: Moderate

Composition

Ogontz and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Somewhat poorly drained soils
- Soils that have a surface layer of silt loam
- Soils that have more sand in the subsoil

Dissimilar soils:
- Bixler soils on rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OhB—Ogontz silt loam, 2 to 6 percent slopes

Setting

Landform: Lake plains, deltas
Position on the landform: Knolls, backslopes, shoulders
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam
Subsoil:
9 to 32 inches—yellowish brown, mottled, friable and firm silty clay loam
Substratum:
32 to 80 inches—yellowish brown and light brownish gray, mottled, friable silt loam stratified with silty clay loam and fine sandy loam

Soil Properties and Qualities

Available water capacity: About 9.2 inches to a depth of 60 inches

Cation-exchange capacity: 9 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Stratified lacustrine deposits
Permeability: Moderate
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Ogontz and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more sand in the subsoil
- Somewhat poorly drained soils
- Better drained soils on slopes of 6 to 12 percent

Dissimilar soils:
- Algiers soils on toeslopes along depressions and drainageways
- Zurich soils on slopes of 12 to 18 percent

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OmA—Olmsted loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, drainageways, depressions
Size of areas: 5 to 150 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 9 inches—very dark gray, friable loam
Subsoil:
9 to 31 inches—gray and dark gray, mottled, friable loam and clay loam
Substratum:
31 to 40 inches—gray, mottled, friable sandy loam
40 to 80 inches—gray and dark gray, loose loamy sand with strata of sand

Soil Properties and Qualities

Available water capacity: About 7.1 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 4 to 8 percent
Parent material: Loamy deposits
Permeability: Moderate or moderately rapid in the subsoil
Duration of ponding: Very brief
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Olmsted and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil
- Soils that have fewer rock fragments in the subsoil

Dissimilar soils:
- Jimtown soils on rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section

- “Engineering” and “Soil Properties” sections

OpA—Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas
Size of areas: 10 to 300 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable silt loam
Subsoil:
9 to 41 inches—brown, grayish brown, and gray, mottled, friable silt loam
Substratum:
41 to 63 inches—gray, mottled, friable silt loam
63 to 69 inches—yellowish brown, mottled, friable gravelly loam
Bedrock:
69 to 71 inches—hard, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 9.5 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (60 to 80 inches)
Root zone: Restricted by sandstone bedrock at a depth of 60 to 80 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Flooding: Occasional
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Alluvium overlying sandstone
Permeability: Moderate or moderately rapid
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Orrville and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more sand in the subsoil
- Soils that have bedrock at a depth of more than 80 inches

Dissimilar soils:
- Tioga soils in narrow strips adjacent to stream channels
- Holly soils in depressions
- Soils that have bedrock at a depth of 20 to 40 inches and are intermingled with areas of the Orrville soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OrA—Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas
Size of areas: 10 to 300 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam
Subsoil:
10 to 26 inches—brown and light brownish gray, mottled, friable silt loam and loam
Substratum:
26 to 69 inches—grayish brown, mottled, friable loam and sandy loam
Bedrock:
69 to 71 inches—hard, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 8.8 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (60 to 80 inches)
Root zone: Restricted by sandstone bedrock at a depth of 60 to 80 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet

Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Flooding: Frequent
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Alluvium overlying sandstone
Permeability: Moderate or moderately rapid
Potential for frost action: High
Shrink-swell potential: Low
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Orrville and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more sand in the subsoil
- Soils that have bedrock at a depth of more than 80 inches

Dissimilar soils:
- Tioga soils in narrow strips adjacent to stream channels
- Holly soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OsB—Oshtemo loamy sand, 0 to 6 percent slopes

Setting

Landform: Ground moraines, beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 10 to 200 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, very friable loamy sand
Subsurface layer:
10 to 14 inches—yellowish brown, very friable loamy sand
Subsoil:
14 to 41 inches—brown and dark yellowish brown, friable gravelly sandy clay loam and gravelly coarse sandy loam
Substratum:
41 to 80 inches—dark grayish brown and brown, loose very gravelly coarse sand and sand

Soil Properties and Qualities

Available water capacity: About 6.4 inches to a depth of 60 inches
Cation-exchange capacity: 2 to 12 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by sand and gravel at a depth of 40 to 75 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Loamy and sandy deposits
Permeability: Moderately rapid in the subsoil and very rapid in the substratum
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loamy sand
Hazard of wind erosion: Severe

Composition

Oshtemo and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more rock fragments throughout
- Soils that have more clay in the subsoil

Dissimilar soils:
- Jimtown soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section

- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

PcA—Pewamo silty clay loam, 0 to 1 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Extensive flat areas, drainageways, depressions
Size of areas: 20 to 1,000 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 12 inches—very dark gray, friable silty clay loam
Subsoil:
12 to 33 inches—dark gray and gray, mottled, firm silty clay loam, clay, and clay loam
33 to 48 inches—gray, mottled, firm silty clay loam
Substratum:
48 to 80 inches—gray and grayish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 10.3 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 40 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 12 percent
Parent material: Till or lacustrine deposits over till
Permeability: Moderately slow
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Pewamo and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Bennington and Elliott soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Pg—Pits, gravel or sand

Setting

Landform: Beach ridges on lake plains
Size of areas: 2 to 15 acres
Note: Areas mined for sand or gravel; nearly vertical sidewalls adjacent to undisturbed soils

Soil Properties and Qualities

The properties and qualities vary too much to rate.

Composition

Pits, gravel or sand: 85 percent
Dissimilar inclusions: 15 percent

Inclusions

Dissimilar inclusions:
- Areas of altered soil material near the edges of the mapped areas
- Fox and Oshtemo soils near the edges of the mapped areas

Pk—Pits, quarry

Setting

Landform: Ground moraines, lake plains
Size of areas: 5 to 400 acres
Note: Areas mined for limestone or sandstone; vertical sidewalls adjacent to undisturbed soils

Soil Properties and Qualities

The properties and qualities vary too much to rate.

Composition

Pits, quarry: 90 percent
Dissimilar inclusions: 10 percent

Inclusions

Dissimilar inclusions:
- Rock outcrop near the edges of the mapped areas
- Areas of altered soil material near the edges of the mapped areas
- Pools of water less than 2 acres in size in depressions

PmA—Plumbrook fine sandy loam, 0 to 2 percent slopes

Setting

Landform: Lake plains, deltas
Position on the landform: Flat areas, slight depressions
Size of areas: 20 to 500 acres

Typical Profile

Surface layer:
0 to 11 inches—black, friable fine sandy loam
Subsoil:
11 to 19 inches—dark grayish brown, mottled, friable very fine sandy loam
19 to 29 inches—brownish yellow, mottled, friable fine sandy loam
Substratum:
29 to 65 inches—grayish brown and dark grayish brown, mottled, loose loamy fine sand and fine sand
65 to 80 inches—gray, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 6.7 inches to a depth of 60 inches
Cation-exchange capacity: 9 to 17 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Loamy and sandy deposits overlying finer textured lacustrine deposits
Permeability: Moderately rapid in the loamy and sandy material and moderately slow in the finer textured material
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Fine sandy loam
Hazard of wind erosion: Moderate

Composition

Plumbrook and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a lighter colored surface layer
- Moderately well drained soils
- Soils that have till at a depth of 60 to 80 inches

Dissimilar soils:
- Gilford and Colwood soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section (fig. 8)
- “Land Capability Classification” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RaA—Randolph silt loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silt loam
Subsoil:
10 to 16 inches—yellowish brown, mottled, firm silty clay
16 to 37 inches—grayish brown and gray, mottled, firm silty clay loam and clay loam
Bedrock:
37 to 39 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 5 inches to the limiting layer

Figure 8.—In drained areas the Plumbrook soil is well suited to cropping systems such as no-till planting.

Cation-exchange capacity: 8 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by limestone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Apparent
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till overlying limestone or dolostone
Permeability: Moderately slow
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Randolph and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have a darker surface layer
- Moderately well drained soils

Dissimilar soils:
- Millsdale soils in depressions
- Bennington soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RcA—Rawson sandy loam, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, rises
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 11 inches—brown, friable sandy loam
Subsoil:
11 to 18 inches—yellowish brown, friable sandy loam
18 to 33 inches—yellowish brown and brown, mottled, friable loam
33 to 42 inches—grayish brown and dark grayish brown, mottled, firm clay loam
Substratum:
42 to 80 inches—dark yellowish brown and brown, mottled, firm clay loam

Soil Properties and Qualities

Available water capacity: About 7.5 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till or lacustrine deposits at a depth of 24 to 51 inches
Depth to the seasonal high water table: 2.0 to 3.5 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Permeability: Moderate in the loamy material and very slow or slow in the underlying material
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Sandy loam
Hazard of wind erosion: Moderate

Composition

Rawson and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Soils that have bedrock at a depth of 60 to 80 inches
- Somewhat poorly drained soils
- Soils that have till or lacustrine deposits at a depth of 40 to 80 inches

Dissimilar soils:
- Mermill soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RcB—Rawson sandy loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Knolls, summits, backslopes, shoulders
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable sandy loam
Subsoil:
10 to 12 inches—yellowish brown, friable loam
12 to 22 inches—yellowish brown, friable clay loam
22 to 30 inches—dark yellowish brown, mottled, friable loam
30 to 51 inches—brown, mottled, firm clay loam
Substratum:
51 to 80 inches—brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.3 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till or lacustrine deposits at a depth of 24 to 51 inches
Depth to the seasonal high water table: 2.0 to 3.5 feet
Kind of water table: Perched
Drainage class: Moderately well drained

Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Permeability: Moderate in the loamy material and very slow or slow in the underlying material
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Sandy loam
Hazard of wind erosion: Moderate

Composition

Rawson and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Soils that have bedrock at a depth of 40 to 80 inches
- Soils that have more clay in the subsoil
- Soils that have till or lacustrine deposits at a depth of 40 to 80 inches
- Somewhat poorly drained soils

Dissimilar soils:
- Mermill soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RgA—Rimer loamy fine sand, 0 to 2 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Flat areas, slight rises, summits
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 11 inches—dark grayish brown, very friable loamy fine sand
Subsurface layer:
11 to 25 inches—brown, mottled, very friable loamy fine sand
Subsoil:
25 to 30 inches—light brownish gray, mottled, very friable fine sandy loam
30 to 45 inches—brown, mottled, firm silty clay loam and clay loam
Substratum:
45 to 80 inches—brown, mottled, firm clay loam

Soil Properties and Qualities

Available water capacity: About 5.5 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till at a depth of 25 to 55 inches
Depth to the seasonal high water table: 1.0 to 2.5 feet
Kind of water table: Perched
Drainage class: Somewhat poorly drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Sandy deposits and the underlying till
Permeability: Rapid in the sandy material and very slow or slow in the underlying till
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Rimer and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have till at a depth of 40 to 60 inches
- Moderately well drained soils
- Soils that have a thinner sandy layer

Dissimilar soils:
- Gilford soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RhA—Ritchey loam, 0 to 2 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Flat areas
Size of areas: 5 to 50 acres
Note: This Ritchey soil is a taxadjunct to the Ritchey series because it has more clay in the subsoil than is defined as typical. This difference, however, does not significantly affect the use or management of this map unit.

Typical Profile

Surface layer:
0 to 8 inches—brown, friable loam
Subsoil:
8 to 13 inches—brown, firm silty clay loam
13 to 15 inches—brown, firm silty clay
Bedrock:
15 to 17 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 3 inches to the limiting layer
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Shallow (10 to 20 inches)
Root zone: Restricted by limestone bedrock at a depth of 10 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till overlying limestone
Permeability: Moderate
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Ritchey and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a surface layer of sandy loam
- Soils that have bedrock at a depth of 4 to 10 inches

Dissimilar soils:
- Castalia soils intermingled with areas of the Ritchey soil throughout the map unit
- Dunbridge soils intermingled with areas of the Ritchey soil throughout the map unit

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RhB—Ritchey loam, 2 to 6 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Knolls, summits, backslopes, shoulders
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, friable loam
Subsoil:
8 to 14 inches—reddish brown, firm clay loam
Bedrock:
14 to 16 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 2.9 inches to the limiting layer
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Shallow (10 to 20 inches)
Root zone: Restricted by limestone bedrock at a depth of 10 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till overlying limestone
Permeability: Moderate
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Ritchey and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have bedrock at a depth of 4 to 10 inches

Dissimilar soils:
- Castalia soils intermingled with areas of the Ritchey soil throughout the map unit
- Milton soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RhC—Ritchey loam, 6 to 12 percent slopes

Setting

Landform: Reefs on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable loam
Subsoil:
8 to 18 inches—brown, friable and firm loam and clay loam
Bedrock:
18 to 20 inches—hard, unweathered limestone

Soil Properties and Qualities

Available water capacity: About 3 inches to the limiting layer
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Shallow (10 to 20 inches)
Root zone: Restricted by limestone bedrock at a depth of 10 to 20 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Till overlying limestone
Permeability: Moderate
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Ritchey and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have a surface layer of sandy loam

Dissimilar soils:
- Castalia soils intermingled with areas of the Ritchey soil throughout the map unit
- Milton soils in the less sloping areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SaA—Sandusky loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas near spring orifices
Size of areas: 20 to 150 acres
Note: This is a hydric soil. It is calcareous.

Typical Profile

Surface layer:
0 to 11 inches—very dark gray, friable loam
Substratum:
11 to 22 inches—light brownish gray, friable very gravelly coarse sandy loam
22 to 27 inches—pale brown, mottled, friable coarse sandy loam
27 to 29 inches—light brownish gray, mottled, firm silt loam
29 to 64 inches—gray, mottled, firm silty clay loam with strata of silty clay
64 to 80 inches—dark yellowish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 8.3 inches to a depth of 60 inches
Cation-exchange capacity: 26 to 45 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: Within a depth of 6 inches
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 8 percent
Parent material: Calcareous tufa overlying lacustrine deposits
Permeability: Moderately rapid in the tufa material and slow or moderately slow in the underlying material
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Sandusky and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have thicker deposits of tufa
- Soils that have more tufa fragments in the surface layer

Dissimilar soils:
- Toledo soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SbF—Saylesville silt loam, 25 to 40 percent slopes

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 50 acres
Note: Steep slopes

Typical Profile

Surface layer:
0 to 6 inches—very dark grayish brown, friable silt loam
Subsurface layer:
6 to 9 inches—pale brown, friable silt loam
Subsoil:
9 to 15 inches—brown, friable silty clay loam
15 to 40 inches—dark yellowish brown and brown, mottled, firm silty clay and silty clay loam
Substratum:
40 to 80 inches—brown, mottled, friable silt loam and silty clay loam

Soil Properties and Qualities

Available water capacity: About 10.1 inches to a depth of 60 inches
Cation-exchange capacity: 7 to 21 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 3 to 6 feet
Kind of water table: Apparent
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Lacustrine deposits
Permeability: Moderately slow
Potential for frost action: Moderate
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Saylesville and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have slopes of 18 to 25 percent
- Moderately well drained soils
- Soils that have less clay in the subsoil
- Soils that have till at a depth of 40 to 80 inches

Dissimilar soils:
- Oshtemo soils on the upper backslopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ShB—Shinrock silt loam, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Knolls, summits, backslopes, shoulders
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable silt loam
Subsoil:
9 to 14 inches—yellowish brown, friable silt loam
14 to 39 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam and silty clay
39 to 44 inches—brown, mottled, friable silty clay loam with strata of fine sandy loam
Substratum:
44 to 80 inches—brown, mottled, friable silt loam stratified with silty clay loam and fine sandy loam

Soil Properties and Qualities

Available water capacity: About 8.7 inches to a depth of 60 inches
Cation-exchange capacity: 8 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Lacustrine deposits
Permeability: Moderately slow in the subsoil
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Shinrock and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil
- Soils that have till at a depth of 40 to 80 inches
- Somewhat poorly drained soils

Dissimilar soils:
- Milford soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SkC2—Shinrock silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 50 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silty clay loam
Subsoil:
8 to 32 inches—brown and yellowish brown, mottled, firm silty clay loam
32 to 40 inches—yellowish brown, mottled, firm silty clay loam
Substratum:
40 to 80 inches—yellowish brown, mottled, firm silt loam

Soil Properties and Qualities

Available water capacity: About 8.2 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained

Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Lacustrine deposits
Permeability: Moderately slow in the subsoil
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Shinrock and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam and are not so eroded
- Soils that have less clay in the subsoil
- Somewhat poorly drained soils
- Soils that have till at a depth of 40 to 80 inches

Dissimilar soils:
- Milford soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

SkD2—Shinrock silty clay loam, 12 to 18 percent slopes, eroded

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 50 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silty clay loam
Subsoil:
8 to 36 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam
36 to 42 inches—brown, mottled, firm silty clay loam stratified with silt loam
Substratum:
42 to 80 inches—brown, mottled, firm silt loam stratified with silty clay loam and fine sandy loam

Soil Properties and Qualities

Available water capacity: About 8.2 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Perched
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Lacustrine deposits
Permeability: Moderately slow in the subsoil
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Shinrock and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Well drained soils
- Somewhat poorly drained soils
- Soils that have less clay in the subsoil
- Soils that have till at a depth of 40 to 80 inches

Dissimilar soils:
- Milford soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

SpB—Spinks loamy fine sand, 0 to 6 percent slopes

Setting

Landform: Dunes on lake plains, beach ridges on lake plains
Position on the landform: Knolls, summits, backslopes, shoulders
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, very friable loamy fine sand
Subsoil:
10 to 15 inches—yellowish brown, very friable fine sand
15 to 72 inches—yellowish brown and brown, loose loamy fine sand with bands of dark yellowish brown and brown, very friable loamy fine sand
Substratum:
72 to 80 inches—yellowish brown, loose fine sand

Soil Properties and Qualities

Available water capacity: About 4 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Eolian or beach deposits
Permeability: Moderately rapid or rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Spinks and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have till or lacustrine deposits at a depth of 40 to 80 inches
- Soils that have more rock fragments in the substratum
- Soils that do not have lamellae in the subsoil

Dissimilar soils:
- Udipsamments in areas mined for sand

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SpD—Spinks loamy fine sand, 12 to 18 percent slopes

Setting

Landform: Dunes on lake plains, beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 30 acres

Typical Profile

Surface layer:
0 to 13 inches—dark grayish brown, very friable loamy fine sand
Subsoil:
13 to 38 inches—strong brown, loose loamy fine sand
38 to 80 inches—brown, loose loamy fine sand with bands of brown, very friable loamy fine sand

Soil Properties and Qualities

Available water capacity: About 4.5 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Eolian or beach deposits
Permeability: Moderately rapid or rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Spinks and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have no lamellae in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches
- Soils that have more rock fragments in the substratum

Dissimilar soils:
- Udipsamments in areas mined for sand

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

TgA—Tioga loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 5 inches—dark brown, friable loam
Subsoil:
5 to 26 inches—brown, friable loam
Substratum:
26 to 72 inches—brown, friable sandy loam with strata of fine sandy loam and loamy sand
72 to 80 inches—gray, mottled, friable sandy loam

Soil Properties and Qualities

Available water capacity: About 7.6 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 28 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 3 to 6 feet
Kind of water table: Apparent
Drainage class: Well drained
Flooding: Occasional
Content of organic matter in the surface layer: 2 to 4 percent
Parent material: Alluvium
Permeability: Moderate to rapid in the substratum
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Loam
Hazard of wind erosion: Slight

Composition

Tioga and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have more silt throughout
- Moderately well drained soils
- Soils that have more clay in the subsoil
- Soils that have bedrock at a depth of 40 to 80 inches

Dissimilar soils:
- Orrville soils in concave areas and near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- "Crops and Pasture" section
- "Land Capability Classification" section
- "Woodland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

TnA—Toledo silty clay loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Size of areas: 20 to 500 acres
Note: This is hydric soil. It is subject to ponding and has a calcareous surface layer.

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable silty clay loam

Subsoil:
9 to 55 inches—gray, mottled, firm and very firm silty clay and clay
Substratum:
55 to 80 inches—dark yellowish brown, mottled, firm silty clay with strata of silty clay loam

Soil Properties and Qualities

Available water capacity: About 7.4 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 36 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Lacustrine deposits
Permeability: Slow
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: High
Texture of the surface layer: Silty clay loam
Hazard of wind erosion: Slight

Composition

Toledo and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay throughout
- Soils that have a lighter colored surface layer
- Soils with a surface layer that is noncalcareous

Dissimilar soils:
- Fulton soils on slight rises
- Sandusky soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ToA—Toledo silty clay, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Size of areas: 50 to 1,000 acres
Note: This is a hydric soil. It is subject to ponding

Typical Profile

Surface layer:
0 to 9 inches—very dark gray, firm silty clay
Subsoil:
9 to 45 inches—dark gray and gray, mottled, firm and very firm silty clay and clay
Substratum:
45 to 80 inches—light brownish gray, mottled, firm silty clay with strata of silty clay loam

Soil Properties and Qualities

Available water capacity: About 6.6 inches to a depth of 60 inches
Cation-exchange capacity: 22 to 45 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 1 foot above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 6 percent
Parent material: Lacustrine deposits
Permeability: Slow
Duration of ponding: Brief
Potential for frost action: High
Shrink-swell potential: High
Texture of the surface layer: Silty clay
Hazard of wind erosion: Slight

Composition

Toledo and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have less clay throughout
- Soils that have a lighter colored surface layer
- Soils with a surface layer that is calcareous

Dissimilar soils:
- Fulton soils on slight rises

• Sandusky soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

• “Crops and Pasture” section
• “Land Capability Classification” section
• “Woodland” section
• “Recreation” section
• “Wildlife Habitat” section
• “Engineering” and “Soil Properties” sections

TpA—Toledo silty clay, 0 to 1 percent slopes, ponded

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Size of areas: 10 to 600 acres
Note: This is a hydric soil. It is subject to ponding.

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown, firm silty clay
Subsoil:
8 to 46 inches—dark gray and gray, mottled, firm silty clay and clay
Substratum:
46 to 80 inches—gray, mottled, firm clay

Soil Properties and Qualities

Available water capacity: About 7 inches to a depth of 60 inches
Cation-exchange capacity: 22 to 45 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: 3 feet above the surface to 1 foot below the surface
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 4 to 8 percent
Parent material: Lacustrine deposits
Permeability: Slow
Duration of ponding: Very long
Potential for frost action: High
Shrink-swell potential: High
Texture of the surface layer: Silty clay
Hazard of wind erosion: Slight

Composition

Toledo and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
• Soils that have less clay throughout
• Soils that have a lighter colored surface layer
Dissimilar soils:
• Udorthents in areas dredged during the construction of dikes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

• “Crops and Pasture” section
• “Land Capability Classification” section
• “Recreation” section
• “Wildlife Habitat” section
• “Engineering” and “Soil Properties” sections

TuA—Tuscola fine sandy loam, 0 to 2 percent slopes

Setting

Landform: Lake plains, deltas
Position on the landform: Flat areas, rises
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, very friable fine sandy loam
Subsurface layer:
9 to 15 inches—light yellowish brown, mottled, very friable loamy fine sand
Subsoil:
15 to 35 inches—dark yellowish brown and brown, mottled, friable fine sandy loam and loam
35 to 46 inches—grayish brown, mottled, friable silt loam stratified with silty clay loam and fine sandy loam
Substratum:
46 to 49 inches—brown, mottled, firm silty clay loam
49 to 56 inches—grayish brown, mottled, friable fine sandy loam
56 to 80 inches—brown, mottled, loose loamy fine sand

Soil Properties and Qualities

Available water capacity: About 10 inches to a depth of 60 inches
Cation-exchange capacity: 4 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Stratified lacustrine deposits
Permeability: Rapid in the subsurface layer and moderate in the subsoil and substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Fine sandy loam
Hazard of wind erosion: Moderate

Composition

Tuscola and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Somewhat poorly drained soils
- Soils that have less clay in the subsoil
- Soils that have less sand in the subsoil
- Soils that have a surface layer of loamy fine sand

Dissimilar soils:
- Colwood soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section (fig. 9)
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TuB—Tuscola fine sandy loam, 2 to 6 percent slopes

Setting

Landform: Lake plains, deltas
Position on the landform: Knolls, backslopes, shoulders
Size of areas: 5 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, friable fine sandy loam
Subsurface layer:
10 to 16 inches—yellowish brown, very friable loamy fine sand
Subsoil:
16 to 31 inches—yellowish brown, mottled, friable and firm silt loam and silty clay loam
31 to 46 inches—dark yellowish brown and brown, mottled, friable silt loam
Substratum:
46 to 80 inches—gray, mottled, friable silt loam

Soil Properties and Qualities

Available water capacity: About 9.9 inches to a depth of 60 inches
Cation-exchange capacity: 4 to 15 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 1.5 to 3.0 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Stratified lacustrine deposits
Permeability: Rapid in the subsurface layer and moderate in the subsoil and substratum
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Fine sandy loam
Hazard of wind erosion: Moderate

Composition

Tuscola and similar soils: 95 percent
Dissimilar soils: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loamy fine sand
- Soils that have less clay in the subsoil
- Soils that have less sand in the subsoil
- Somewhat poorly drained soils

Dissimilar soils:
- Colwood soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

Figure 9.—This Tuscola soil is well suited to no-till corn production.

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

UcB—Udipsamments-Spinks complex, 0 to 6 percent slopes

Setting

Landform: Beach ridges on lake plains, dunes on lake plains
Position on the landform: Udipsamments—flat areas, rises; Spinks—backslopes, shoulders
Size of areas: 5 to 50 acres
Note: Areas altered when mined for sand

Typical Profile

Udipsamments

Surface layer:
0 to 40 inches—sand or loamy sand
Substratum:
40 inches and below—stratified silty and loamy layers

Spinks

Surface layer:
0 to 13 inches—brown, very friable loamy fine sand
Subsoil:
13 to 34 inches—yellowish brown, loose fine sand

34 to 71 inches—yellowish brown, loose fine sand and loamy fine sand with bands of loamy fine sand
Substratum:
71 to 80 inches—light brown, loose fine sand

Soil Properties and Qualities

Udipsamments

Depth class: Very deep (more than 80 inches)
Root zone: Depth varies
Drainage class: Well drained
Depth to the seasonal high water table: More than 6 feet
Note: Other soil properties and qualities vary too much to rate.

Spinks

Available water capacity: About 4.4 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 20 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Parent material: Eolian or beach deposits
Permeability: Moderately rapid or rapid
Potential for frost action: Low
Shrink-swell potential: Low
Texture of the surface layer: Loamy fine sand
Hazard of wind erosion: Severe

Composition

Udipsamments and similar soils: 70 percent
Spinks and similar soils: 30 percent

Inclusions

Similar soils:
- Moderately well drained soils
- Soils that have bedrock at a depth of 40 to 80 inches

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

UdB—Udorthents, loamy, 0 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains, stream terraces, flood plains
Position on the landform: Flat areas, rises
Size of areas: 5 to 60 acres
Note: Areas altered during construction

Typical Profile

0 to 80 inches—typically silt loam or silty clay loam soil material that is a mixture of the subsoil and substratum

Soil Properties and Qualities

The soil properties and qualities vary too much to rate.

Composition

Udorthents and similar components: 85 percent
Dissimilar components: 15 percent

Inclusions

Similar components:
- Stockpiles of disturbed materials

Dissimilar inclusions:
- Rock outcrop intermingled in areas with the Udorthents throughout the map unit
- Areas of urban development intermixed throughout the map unit
- Undisturbed soils near the edges of the mapped areas

W—Water

Setting

This map unit consists of areas inundated with water for most of the year.

Composition

This map unit generally includes rivers, lakes, and ponds.

Use and Management

No interpretations are given for this map unit.

WaB—Wakeman sandy loam, 2 to 6 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable sandy loam
Subsoil:
10 to 27 inches—yellowish brown, very friable and friable sandy loam
Substratum:
27 to 31 inches—yellowish brown, friable sandy loam
Bedrock:
31 to 33 inches—hard, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 4.2 inches to the limiting layer
Cation-exchange capacity: 4 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 2 percent
Parent material: Sandstone residuum
Permeability: Moderately rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Sandy loam
Hazard of wind erosion: Moderate

Composition

Wakeman and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have more rock fragments in the subsoil
- Soils that have more clay in the subsoil

Dissimilar soils:
- Mitiwanga soils near the base of slopes
- Conotton soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

WaC—Wakeman sandy loam, 6 to 12 percent slopes

Setting

Landform: Ground moraines, lake plains
Position on the landform: Backslopes
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable sandy loam
Subsoil:
9 to 17 inches—yellowish brown, friable gravelly sandy loam
17 to 25 inches—yellowish brown, friable channery sandy loam
Substratum:
25 to 32 inches—yellowish brown, friable extremely flaggy sandy loam
Bedrock:
32 to 34 inches—hard, unweathered sandstone

Soil Properties and Qualities

Available water capacity: About 4.2 inches to the limiting layer
Cation-exchange capacity: 4 to 16 milliquivalents per 100 grams in the surface layer
Depth class: Moderately deep (20 to 40 inches)
Root zone: Restricted by sandstone bedrock at a depth of 20 to 40 inches
Depth to the seasonal high water table: More than 6 feet
Drainage class: Well drained
Content of organic matter in the surface layer: 1 to 2 percent
Parent material: Sandstone residuum
Permeability: Moderately rapid
Potential for frost action: Moderate
Shrink-swell potential: Low
Texture of the surface layer: Sandy loam
Hazard of wind erosion: Moderate

Composition

Wakeman and similar soils: 85 percent
Dissimilar soils: 15 percent

Inclusions

Similar soils:
- Soils that have slopes of 12 to 18 percent
- Soils that have more rock fragments in the subsoil

- Soils that have more clay in the subsoil

Dissimilar soils:
- Mitiwanga soils near the base of slopes
- Conotton soils near the edges of the mapped areas
- Oakville soils near the edges of the mapped areas

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

WeA—Weyers silt loam, 0 to 1 percent slopes

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas near spring orifices
Size of areas: 20 to 1,000 acres
Note: This is a hydric soil. It is calcareous.

Typical Profile

Surface layer:
0 to 13 inches—black, friable silt loam
Substratum:
13 to 20 inches—light brownish gray, very friable gravelly loamy coarse sand
20 to 43 inches—very pale brown and pale brown, very friable gravelly sandy loam and sandy loam
43 to 45 inches—black, friable sapric material
45 to 80 inches—gray and grayish brown, mottled, firm silty clay loam

Soil Properties and Qualities

Available water capacity: About 8.2 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 39 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Seasonal high water table: Within a depth of 6 inches
Kind of water table: Apparent
Drainage class: Very poorly drained
Content of organic matter in the surface layer: 3 to 8 percent
Parent material: Calcareous tufa overlying lacustrine deposits
Permeability: Moderately rapid in the tufa material and slow or moderately slow in the underlying material
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Weyers and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Soils that have more tufa fragments in the upper part of the substratum
- Soils that have thinner deposits of tufa
- Soils that have thicker deposits of tufa

Dissimilar soils:
- Toledo soils near the edges of the mapped areas
- Undrained areas of Weyers soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ZuC2—Zurich silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 30 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 9 inches—yellowish brown, friable silt loam
Subsoil:
9 to 42 inches—yellowish brown and brown, mottled, friable and firm silt loam and silty clay loam

Substratum:
42 to 80 inches—brown, mottled, friable silt loam with strata of silty clay loam and fine sandy loam

Soil Properties and Qualities

Available water capacity: About 11.9 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 2.0 to 3.5 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Lacustrine deposits
Permeability: Moderate in the subsoil
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Zurich and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Soils that have slopes of 12 to 18 percent
- Soils that have more clay in the subsoil

Dissimilar soils:
- Algiers soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ZuD2—Zurich silt loam, 12 to 18 percent slopes, eroded

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 30 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam
Subsoil:
9 to 24 inches—yellowish brown, mottled, friable silty clay loam
Substratum:
24 to 44 inches—olive brown, mottled, friable silt loam with strata of fine sandy loam, loamy fine sand, and silty clay loam
44 to 80 inches—light olive brown, mottled, friable stratified silt loam and fine sandy loam

Soil Properties and Qualities

Available water capacity: About 11.5 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 2.0 to 3.5 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Lacustrine deposits
Permeability: Moderate in the subsoil
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Zurich and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Soils that have slopes of 6 to 12 percent
- Soils that have more clay in the subsoil

Dissimilar soils:
- Algiers soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section

- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ZuE2—Zurich silt loam, 18 to 25 percent slopes, eroded

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 30 acres
Note: The original surface layer has been partially removed by erosion.

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, friable silt loam
Subsoil:
5 to 23 inches—yellowish brown, friable silt loam
23 to 34 inches—brown, mottled, friable silt loam
Substratum:
34 to 80 inches—grayish brown, mottled, friable silt loam stratified with very fine sand

Soil Properties and Qualities

Available water capacity: About 11.6 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 2.0 to 3.5 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Parent material: Lacustrine deposits
Permeability: Moderate in the subsoil
Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Zurich and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Soils that have a surface layer of fine sandy loam
- Soils that have more clay in the subsoil

Dissimilar soils:
- Algiers soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

ZuF—Zurich silt loam, 25 to 40 percent slopes

Setting

Landform: Dissected areas on lake plains
Position on the landform: Backslopes
Size of areas: 5 to 40 acres
Note: Steep slopes

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown, friable silt loam
Subsurface layer:
6 to 8 inches—brown, friable silt loam
Subsoil:
8 to 12 inches—yellowish brown, friable silt loam
12 to 21 inches—dark yellowish brown, friable silt loam
21 to 47 inches—dark yellowish brown, mottled, friable silt loam with strata of silty clay loam
Substratum:
47 to 80 inches—brown, mottled, friable silt loam

Soil Properties and Qualities

Available water capacity: About 11.9 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 22 milliquivalents per 100 grams in the surface layer
Depth class: Very deep (more than 80 inches)
Root zone: Extends to a depth of more than 80 inches
Depth to the seasonal high water table: 2.0 to 3.5 feet
Kind of water table: Apparent
Drainage class: Moderately well drained
Content of organic matter in the surface layer: 1 to 3 percent
Parent material: Lacustrine deposits
Permeability: Moderate in the subsoil

Potential for frost action: High
Shrink-swell potential: Moderate
Texture of the surface layer: Silt loam
Hazard of wind erosion: Slight

Composition

Zurich and similar soils: 90 percent
Dissimilar soils: 10 percent

Inclusions

Similar soils:
- Well drained soils
- Soils that have a surface layer of fine sandy loam
- Soils that have more clay in the subsoil

Dissimilar soils:
- Algiers soils near the base of slopes

Management

For general and detailed information about managing this map unit, see the following sections and their corresponding tables:

- “Crops and Pasture” section
- “Land Capability Classification” section
- “Woodland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The soils in the survey area are assigned to various interpretive groups in some of the tables. The groups for each map unit also are shown under the heading "Interpretive Groups."

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The system of land capability classification used by the Natural Resources Conservation Service is explained, prime farmland is described, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and the crop yield index assigned to some of the soils in the county is explained.

Planners of management systems for individual fields or farms should consider the information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Trends in Land Use

Agriculture is the primary land use in Erie County. In 1982, farms made up about 100,000 acres, or 55 percent of the land in Erie County. There were 535 farms in the county, with an average size of 185 acres (U.S. Department of Commerce 1993). About 5,600 acres was used for pasture. Only about 16,900 acres in the county was urban or built-up land (USDA, SCS 1987). In 1992, farms only made up about 90,000 acres, or nearly 50 percent of the land in the county. There were only 406 farms, but the average size of the farms increased to 219 acres. About 94,900 acres was used as cropland, 6,700 acres as pasture, and 27,400 acres as urban or built-up land (U.S. Department of Commerce 1993; USDA, NRCS 1996). These figures reflect the nationwide trends toward larger farms with fewer operators and conversion of farmland to urban or nonfarm uses.

Although corn, soybeans, and wheat are the principal crops in the county, the soils and climate are suited to grain sorghum, sunflowers, oats, barley, rye, and buckwheat. Specialty crops, such as tomatoes, sugar beets, and cucumbers, could be grown more extensively in the survey area.

Soil Properties and Cropland Management

Prime agricultural land is in scattered areas throughout the county. If good management practices are applied, most soils in the county are highly productive when used for crops or pasture. Major soil management concerns are based upon similarities and differences in soil properties and qualities associated with the different types of soil. The major soil management concerns in the county are seasonal wetness, including ponding; water and wind erosion; damage to soil structure, including compaction, crusting, and clod formation; droughtiness; and soil fertility.

Seasonal wetness and ponding are the major management concerns on about 117,026 acres of land in the county. The very poorly drained Colwood, Condit, Holly, Mermill, Milford, Millgrove, Miner, and Pewamo soils are naturally so wet that crop production is generally not possible unless a surface or subsurface drainage system is installed. The somewhat poorly drained Bennington, Elliott, Haskins, Jimtown, Mahoning, and Orrville soils are naturally so wet that crops are damaged during most years and planting and harvesting are delayed unless a drainage system is installed.

Small areas of wet soils are commonly included in areas of the moderately well drained Cardington, Ellsworth, Shinrock, and Tuscola soils. These wet soils are in seeps, along drainageways, and in swales. Random subsurface drainage systems are needed in these areas for maximum crop production.

The design of surface and subsurface drainage systems varies with the kind of soil. Both surface and subsurface drains are needed in many areas of the very poorly drained Colwood, Condit, Holly, Mermill, Milford, Millgrove, Miner, and Pewamo soils used for intensive crop production. The drains should be more closely spaced in soils that have slow or very slow permeability than in soils that have moderately slow permeability. Bennington, Condit, Fulton, Mahoning, Miner, and Toledo soils are slowly permeable or very slowly permeable.

Establishing adequate outlets for subsurface drainage systems can be difficult in some areas of Condit, Holly, Millgrove, Miner, and Pewamo soils. Existing county and private drainage systems should be maintained as adequate outlets for present and future land uses. These systems often become outlets for basement and septic system curtain drains in many areas of Erie County. Urban construction activities can damage and disrupt these existing systems. As a result, renewed wetness and ponding of these previously drained cropland areas now impact the homeowners' use of this land. Cooperation between the urban and agricultural communities is needed in order to maintain or improve these drainage systems.

Information about the design of drainage systems for each kind of soil is provided in the "Field Office Technical Guide," which is available in the local office of the Natural Resources Conservation Service or the Erie Soil and Water Conservation District.

Water erosion is a major concern on about 23,494 acres in the county. It generally is a hazard in areas where the soil is bare of vegetation and has slope of more than 2 percent. The severity of this hazard increases as slope increases.

Erosion reduces natural soil fertility and productivity as the original topsoil is removed and the more acid subsoil is incorporated into the surface layer through tillage. The need for lime and fertilizer to replace lost plant nutrients and maintain productivity is increased. If the amount of annual soil loss exceeds the rate at which new soil is formed, long-term productivity and natural fertility are affected. Loss of the original topsoil is of particular concern in areas of soils that have a high content of clay in the subsoil, such as Bennington, Cardington, Ellsworth, Hornell, Mahoning, Milton, and Shinrock soils.

Erosion increases the cost of crop production, results in poor soil structure in the surface layer, increases the need for tillage to incorporate organic matter into the surface layer, and reduces the available water capacity of the surface layer. Tillage of eroded areas is needed in order to prepare a good seedbed, and more energy is used during tillage in many of the sloping fields. A lower population of plants is the result of inadequate soil-to-seed contact and the lower available water capacity. These more eroded spots are common in areas of Amanda, Cardington, Ellsworth, and Shinrock soils.

Eroding soil particles with attached nutrients, herbicides, and pesticides enter drainageways, streams, rivers, ponds, lakes, and reservoirs. These sediments can fill drainage ditches and block subsurface drainage outlets. Sediment removal is the most costly item in ditch maintenance. Controlling erosion helps to protect the soil resource base, maintain long-term productivity, minimize drainage maintenance costs, and maintain water quality.

Wind erosion is a hazard on some soils in the county. Sandy soils, such as Spinks and Elnora soils, are particularly susceptible to this type of erosion. The abrasive action of windblown sand particles damages crops. Minimizing tillage, plowing during the spring instead of the fall, and growing cover crops help to control wind erosion. Installing sod strips and windbreaks can reduce the effects of wind velocity and minimize the damage caused by windblown particles.

Crop rotations, cover crops, crop residue management, water- and sediment-control basins, grassed waterways, and a conservation tillage system help to control erosion. Also, plowing in the spring rather than in the fall helps to control erosion. Selecting management measures that conform to a particular cropping system helps to keep soil loss to an amount that will not reduce long-term productivity.

Crop rotations that include cover crops and grasses and legumes reduce the hazard of erosion by providing a protective vegetative cover for extended periods. This vegetative cover helps to protect the soil from the erosive action of raindrops and to control runoff. The rate of water infiltration increases as soil structure improves in the surface layer. The proportion of hay or pasture in the rotation should increase as the percent of slope increases.

A system of conservation tillage, including no-till planting, that leaves crop residue on the surface can help to control erosion on most of the soils in the county. Well drained and moderately well drained soils that dry and warm early in the spring are best suited to such a system. Surface and subsurface drainage systems should be installed in areas of somewhat poorly drained and very poorly drained soils if a conservation tillage system is applied. Water- and sediment-control basins can be used in place of grassed waterways in small watersheds. These basins are earth embankments, generally constructed across the slope of minor watercourses. They help to trap sediment and minimize gully erosion. A high level of management, including weed and insect control, is also needed.

Soil structure damage in the surface layer is more commonly referred to as compaction, crusting, or clod formation. Soil compaction is a general management concern on all of the cropland in the county. Pressure applied to the soil surface by farm machinery can cause compaction if the equipment is operated when the soil is soft and compressible because of wetness. As soil structural units are mashed and smeared, the pore space occupied by air and water within these structural units and between the structural units is reduced. Air and water movement into and out of the soil is also restricted, resulting in ponding of surface water. This ponding is especially noticeable at the ends of fields where increased traffic occurs. Root penetration is restricted to the upper part of the subsoil. Lower crop yields are most noticeable at the ends of fields. Factors that affect compaction on all soils include machinery size, weight and design (pounds of force per square inch of soil surface area), and type of farm implements (wheeled versus tracked).

In addition to compaction, soil texture and soil moisture content also affect crusting and clod formation. Crusting occurs when the bare soil surface becomes hardened. A crust forms as soon as the surface layer starts to dry after periods of intense rainfall. Many of the soils in Erie County have a surface layer of silt loam or silty clay loam. A crust can form at the surface of these soils as the granular soil structure is destroyed by tillage. It must be broken before some crop seedlings will be able to emerge, especially in areas that are continuously row cropped and in which conventional tillage systems are used.

Clod formation involves hardening of the entire surface layer. Clods form if a soil is tilled when the soil moisture content is too high. Clod formation is most noticeable in areas of soils that have a surface layer with a high in content of clay. Additional tillage is needed to break up the clods and to facilitate preparation of a good seedbed. Unless adequate rain is received soon after planting, the plant population is lower because of inadequate soil-to-seed contact and inadequate available water.

Compaction, crusting, and clod formation can be minimized by tilling the soil at the proper soil moisture content. Less tillage results in less destruction of soil structure. No-till systems initially result in less pore space for air and water movement; however, after 2 or 3 years, new soil structural units are formed and pore space increases for air and water movement. More roots in the soil contribute to better soil structure. In addition, decreased tillage results in an increased number of macropores, or earthworm burrows, and helps to increase the pore space in the soil. This condition is most noticeable in soils with a long-term, no-till management system; a cover of permanent pasture; or a crop rotation that includes grass in the hay part of the rotation.

Droughtiness refers to an insufficient amount of water available for good crop growth between rains. Some soils have a higher available water capacity than others. Droughty soils that are used as cropland or pasture in Erie County are Castalia, Conotton, Dekalb, Marblehead, Milton, Mitiwanga, Oakville, Oshtemo, and Ritchey soils. A moderate depth to bedrock, stony or gravelly material in the lower part of the subsoil, severe erosion, or any combination of these soil properties and qualities results in a low available water capacity.

Many of the soils in which moisture shortages occur are well suited to a system of conservation tillage, such as no-till planting, that leaves crop residue on the surface. The crop residue increases the moisture supply by increasing the rate of water infiltration and by reducing runoff and evaporation rates.

Soil fertility depends on the natural fertility level and past use and management, including previous applications of lime and fertilizer. As a result, fertility can vary widely from field to field, even on the same kind of soil.

About 16 chemical elements are essential to the growth of plants. High crop yields and productive pastures require adequate levels of plant nutrients, lime, and organic matter. Maintaining these levels results in sustained high yields on all of the soils in the county.

Many nutrients are most readily available to plants in areas where the soil is nearly neutral in reaction (pH). They are less readily available where the soil is more acid or more alkaline. Some soils, such as Allis, Dekalb, Chili, Conotton, Hornell, Jimtown, Miner, Mitiwanga, Orrville, Tioga, and Wakeman soils, are acid in the upper part of the root zone. In these soils, periodic additions of lime are needed to increase the availability of plant nutrients.

Soil texture, organic matter content, and the type of clay minerals influence the cation-exchange capacity of the soil, which affects the storage and availability of nutrients. The ability to store and release plant nutrients increases as the content of clay and organic matter increases. Pewamo soils have a high content of clay and organic matter and a high capacity to store and release plant nutrients. Soils that have a lower content of clay or organic matter, such as Conotton and Oakville soils, have a reduced capacity to store and release nutrients and lose more nutrients through leaching. On these soils, frequent applications of a small amount of fertilizer can compensate for the nutrients lost through leaching.

On all soils, additions of lime and fertilizer should be based on the results of soil tests and on crop needs for the expected level of yields. The Ohio State University Extension can help in determining the kinds and amounts of fertilizer and lime to be applied.

Organic matter influences many soil properties, including color, structure, tilth, the rate of water infiltration, available water capacity, and the cation-exchange capacity. In Erie County, soils that have a light colored surface layer generally have a moderate or low content of organic matter in the surface layer. Soils that have a dark surface layer have a high content of organic matter. Cultivation tends to lower the organic matter content by increasing the rates of oxidation and erosion on sloping soils. Returning all crop residue to the soil helps to maintain the organic matter content. Cover crops, sod crops, green manure crops, and additions of manure help to increase the organic matter content.

Sewage sludge can have economic value as a source of organic matter and some plant nutrients. If the sludge is applied to land, management concerns include the application rate, the hazards associated with heavy metals, possible odor problems, and health hazards. The chemical composition of the sludge should be determined before the sludge is applied. Applications of sludge to cropland should be based on analysis of the sludge, the results of soil tests, and the expected level of crop yields. The Ohio State University Extension can provide information about the application of sewage sludge.

Erosion Factors

Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices. Definitions and criteria for the soil erodibility factor (K), fragment-free soil erodibility factor (Kf), soil-loss tolerance factor (T), and the wind erodibility groups can be obtained in the section entitled “Physical and Chemical Properties” in the “Soil Properties” section.

Additional information about wind erodibility groups and K, Kf, and T factors can be obtained from a local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Soil Properties and Pasture Management

Some of the acreage in the county is used as pasture. The more common pasture and hay plants are alfalfa, red clover, alsike clover, bluegrass, orchardgrass, tall fescue, timothy, and bromegrass. Pastures are commonly in areas of soils that have severe limitations affecting row crops. Very shallow or stony soils, such as Castalia and Marblehead soils, or soils on the steeper slopes, such as Zurich and Shinrock soils, are commonly used for pasture.

The ability of a pasture to produce forage and to provide enough cover for erosion control is influenced by the number of livestock, the length of the period of grazing, the timeliness of grazing, the forage being grazed, and the availability of water. Good management measures, such as proper stocking rates, pasture rotation, timely deferment of grazing, applications of lime and fertilizer, and control of weeds and insects, help to maintain the key forage plants. Maintaining soil fertility and mowing help to control weeds. The need for lime and fertilizer should be determined by soil tests. The amount of nutrients to be applied should be based on the requirements of the grasses or legumes to be grown.

Erosion control is a management need on gently sloping to very steep soils used for pasture. The hazard of erosion increases as the slope increases. Many of these soils are already eroded. Control of erosion is particularly important when the pasture is seeded. Using a no-till seeding method or growing small grain as a companion crop can help to control further erosion.

Soil compaction is caused by overgrazing or grazing when the soils are wet. It can greatly reduce the vigor of pasture plants. Also, it can increase the runoff rate and the hazard of erosion on sloping soils. Deferment of grazing during wet periods minimizes compaction. A subsurface drainage system can be effective in removing excess water from pastured areas of soils that are very poorly drained or somewhat poorly drained.

Seeding mixtures should be selected on the basis of soil type and the desired management system. Legumes increase the nutrient value of the forage and provide nitrogen for the growth of grasses. Alfalfa should be seeded on well drained soils that have adequate levels of plant nutrients and lime. The wetter soils are better suited to alsike clover than to red clover or to alfalfa. Information about seeding mixtures, herbicide treatment, and other management measures for specific soils can be obtained from the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Specialty Crops

The specialty crops grown commercially in Erie County include vegetables, nursery stock, Christmas trees, and fruits. Some specialty crops in the county are irrigated (fig. 10). The slope, water-holding capacity, infiltration rate, and rooting depth should be considered in irrigated areas. The slope should not exceed 6 percent. Well drained and moderately well drained soils that have a loamy or sandy surface layer, such as Fox, Elnora, and Oshtemo soils, respond best to irrigation. Most irrigation water in the county is obtained from wells and ponds.

The moderating effect of Lake Erie on the weather in Erie County is one of the most important reasons for the success of specialty crops. Freezing weather is delayed in the fall, and cooler spring winds delay bud break and thus reduce the chance of early frost damage. Because of the wide variety of soils in the county, most growers of specialty crops can find areas of soils that are suited to their management plans.

Specialty crops grown in Erie County include tomatoes, cabbage, sugar beets, asparagus, melons, pumpkins, popcorn, sweet corn, and peppers. These crops grow best on very deep, dark soils that have a high content of organic matter. Good drainage on the surface and in the root zone are important for high productivity. Vegetables grow well on soils that warm up early and are not susceptible to compaction. A drainage system can be used in the more poorly drained areas. Elnora, Gilford, and Plumbrook soils are farmed intensively for vegetable production.

Orchard crops grown in the county include apple, peach, plum, pear, and cherry trees. They grow well on the better drained soils that have a loamy or sandy surface layer, such as Chili and Oshtemo soils. Large areas of loamy or sandy soils that are underlain by bedrock, such as Dunbridge and Wakeman soils, are planted to orchards. A small percentage of the produce is marketed locally through roadside farm markets, but most fruit is sold statewide through cooperatives.

Vineyards are mainly in the eastern and western parts of the county within close proximity to Lake Erie. Grapes grow well on some of the more acid soils, such as those in the Allis series.

The latest information about growing specialty crops can be obtained from the local office of the Natural Resources Conservation Service or the Ohio State University Extension.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting methods that ensure the smallest possible loss.

Figure 10.—Irrigation increases the yields of crops in areas of the Gilford soils, in the foreground, and the Elnora soils, in the background.

The estimated yields reflect the productive capacity of each map unit for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Table 6a shows the crop yield index in Erie County, and table 6b shows the hay and pasture yield index. The yield index reflects the relative productivity of a soil in relation to other soils in the county. This index is provided to assist in ranking soils by relative productivity within the county.

For the crop yield index, the most productive soil (Colwood loam, 0 to 1 percent slopes) is given a rating of 100 and other soils are ranked against this standard. The index is based on a crop rotation of corn, soybeans, and winter wheat.

The hay and pasture yield index is based on the total production of hay and pasture for a given soil. For example, Zurich silt loam, 12 to 18 percent slopes, eroded, has a yield per acre of 3.6 tons of orchardgrass-alfalfa hay and 4.2 AUMs for bluegrass-ladino pasture, for a total of 7.8.

Advances in equipment technology, plant genetics, drainage, nutrient and pest management, and soil management can make a standard yield table obsolete within several years. The yield index in tables 6a and 6b should provide users with good information on the relative productivity of soils in the county for years to come.

Some map units are not used for any type of crop production or for hay and pasture and thus are not rated in the tables.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed soil map units in the county for crops are shown in table 7. The main concerns in managing nonirrigated cropland are controlling water erosion, reducing wind erosion, removing excess water, minimizing surface crusting and compaction, and maintaining soil tilth, organic matter content, and fertility.

Generally, a combination of several practices is needed to control *water erosion*. Conservation tillage, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

A combination of several practices also is needed to control *wind erosion*. Conservation tillage, conservation cropping systems, crop residue management, and field windbreaks help to prevent excessive soil loss.

A surface or subsurface drainage system, or both, is used to lower a *seasonal high water table* and to reduce *ponding.*

Tilling within the proper range in moisture content minimizes *surface compaction*.

Measures that help to maintain *soil tilth, organic matter content, and fertility* include applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water intake rate. Applying conservation tillage and conservation cropping systems, farming on the contour, and leaving crop residue on the surface conserve moisture.

Some of the limitations and hazards shown in the table cannot be easily overcome. These are *ponding, flooding, slope, depth to rock,* and *limited organic matter content.*

Ponding.—Surface drains help to remove excess surface water and reduce damage caused by ponding.

Flooding.—Flooding can damage winter grain and forage crops. A tillage method that partly covers crop residue and leaves a rough or ridged surface helps to prevent removal of crop residue by floodwater. Tilling and planting should be delayed in the spring until flooding is no longer a hazard.

Slope.—Where the slope is more than 15 percent, water erosion can be excessive on cultivated fields. The selection of crops and the use of equipment are limited. Cultivation may be restricted.

Depth to rock.—Rooting depth and available moisture may be limited by bedrock within a depth of 40 inches.

Limited organic matter content.—Many soils that have a light-colored surface layer have a low or moderately low organic matter content and weak or moderate structure. Regularly adding crop residue, manure, and other organic materials to the soil maintains or improves the organic matter content and the soil structure.

Additional limitations and hazards are as follows:

Potential for ground-water pollution.—This is a hazard in soils that have excessive permeability or have bedrock or an apparent water table within the profile.

Root-restricting layer.—Soil layers with high bulk density have little pore space. These layers limit water storage and restrict the penetration of plant roots.

Limited available water capacity, poor tilth or *fair tilth,* and *surface crusting.*—These limitations can be overcome by incorporating green manure crops, manure, or crop residue into the soil; applying a system of conservation tillage; and using conservation cropping systems.

Excessive permeability.—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor. Crops generally respond better to smaller, more frequent applications of fertilizer and lime than to one large application.

Surface rock fragments.—This limitation causes rapid wear of tillage equipment. It cannot be easily overcome.

Surface stones.—Stones or boulders on the surface can hinder normal tillage unless they are removed.

Surface crusting.—Hardening of the bare soil surface can hinder or prevent seedling emergence. Minimizing tillage slows the destruction of soil structure and helps prevent crusting. Regular additions of crop residue, manure, or other organic materials help improve soil structure and minimize crusting.

Frost heave.—Frost heaving can damage deep-rooted legumes and some small grain.

Subsidence of organic matter.—Subsidence, or shrinking, occurs as a result of oxidation in the organic material after the soil is drained. Control of the water table by subirrigation through subsurface drain lines reduces the hazards of subsidence, burning, and soil blowing.

Wind erosion.—The detachment and transportation of soil particles by wind. Cover crops and field windbreaks help to protect the soil surface by reducing the amount of exposed surface or by reducing the length of unsheltered areas exposed to prevailing winds.

Following is an explanation of the criteria used to determine the limitations or hazards.

Ponding.—Ponding duration is assigned to the component of the map unit.

Frequent flooding.—The component of the map unit is frequently flooded.

Occasional flooding.—The component of the map unit is occasionally flooded.

High potential for ground-water pollution.—The soil has an apparent water table within a depth of 4 feet or bedrock within a depth of 60 inches or permeability is more than 6 inches per hour in at least one layer within the soil.

Moderate potential for ground-water pollution.—Permeability is between 2 and 6 inches per hour in at least one layer within the soil.

Easily eroded.—The surface K factor multiplied by the upper slope limit is more than 2 (same as criteria for prime farmland).

Slope.—The upper slope range of the component of the map unit is more than 15 percent.

Most of surface layer removed.—The surface layer of the component of the map unit is severely eroded (75 percent or more of the original A and E horizons has been lost).

Part of surface layer removed.—The surface layer of the component of the map unit is eroded (25 to 75 percent of the original A and E horizons has been lost).

Root-restricting layer.—At least one layer within a depth of 40 inches has a bulk density of 1.75 or more.

Limited available water capacity.—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 6 inches or less.

Depth to rock.—Bedrock is within a depth of 40 inches.

Excessive permeability.—The upper limit of the permeability range is 6 inches or more within the soil profile.

Surface stones.—The terms describing the texture of the surface layer include any stony or bouldery modifier, or the soil is a stony or bouldery phase.

Surface rock fragments.—The terms describing the texture of the surface layer include any rock fragment modifier except for gravelly or channery and “surface stones” is not already indicated as a limitation.

Seasonal high water table.—The top of the water table in the component of the map unit is at a depth of 1.5 feet or shallower and a ponding duration is not assigned.

Surface compaction.—The component of the map unit has a surface layer of silt loam, silty clay loam, clay loam, or silty clay.

Poor tilth.—The component of the map unit is severely eroded, has less than 1 percent organic matter in the surface layer, or has more than 35 percent clay in the surface layer.

Fair tilth.—The component of the map unit has a surface layer of silty clay loam or clay loam or is a moderately eroded phase of loam or silt loam.

Surface crusting.—The average organic matter content in the surface layer is less than or equal to 3 percent and the texture is silt loam or silty clay loam.

Limited organic matter content.—The average organic matter content in the surface layer of the component of the map unit is less than or equal to 3 percent.

Frost heave.—The component of the map unit has high potential for frost action.

Subsidence of organic matter.—The organic matter content in the surface layer of the component of the map unit is greater than or equal to 20 percent.

Wind erosion.—The component of the map unit is assigned to wind erodibility group 1 or 2.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding an uppercase letter, *E, W, S,* or *C,* to the class numeral, for example, 2E. The letter *E* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *W* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *S* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *C,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *W, S,* or *C* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 8. The capability classification of the map units in this survey area is given in table 5 and in the section entitled “Interpretive Groups.”

Pasture and Hayland Interpretations

Soils are assigned to pasture and hayland groups according to their suitability for the production of forage. The soils in each group are similar enough to be suited to the same species of grasses or legumes, have similar limitations and hazards, require similar management, and have similar productivity levels and other responses to management.

Under good management, proper grazing is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing helps plants to maintain sufficient and generally vigorous top growth during the growing season. Brush control is essential in many areas, and weed control generally is needed. Rotation grazing and renovation also are important management practices.

Yield estimates are often provided in animal unit months (AUM), or the amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

The pasture and hayland suitability group symbol for each soil is listed in the “Interpretive Groups” section. Soils assigned the same suitability group symbol require the same general management and have about the same potential productivity. The pasture and hayland suitability groups are based on soil characteristics and limitations.

Soils assigned to Group A have few limitations affecting the management and growth of climatically adapted plants.

Soils in group A-1 are very deep and are well drained or moderately well drained. They have a surface layer of silt loam, silty clay loam, clay loam, sandy loam, loam, or loamy sand. Available water capacity ranges from moderate to very high. These soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. A low pH in the subsoil can shorten the life of some deep-rooted legumes in the stand. Slopes range from 0 to 18 percent.

Soils in group A-2 are very deep and are well drained or moderately well drained. They have a surface layer of silt loam. Available water capacity is high or very high. These soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. Slopes range from 18 to 25 percent. The slope may interfere with mechanical application of lime and fertilizer and with clipping, mowing, and spraying for weed control. The slope also increases the hazard of erosion if the areas are overgrazed or cultivated for reseeding. These soils are suited to no-till reseedings and interseedings.

Soils in group A-3 are very deep and are well drained or moderately well drained. They have a surface layer of silt loam. Slopes range from 25 to 40 percent. These soils generally are not suited to pasture or hay because of the slope.

Soils in group A-5 are very deep and well drained. They are subject to occasional periods of flooding. The flooding limits the use of these soils for pasture during periods of stream overflow, and sediment lowers the quality of the forage. The soils have a surface layer of silt loam or loam. Available water capacity is moderate or high. Slopes range from 0 to 2 percent.

Soils in group A-6 are very deep, are moderately well drained, and are subject to frost action. Frost action can damage legume stands. Mixing fibrous-rooted grasses with legumes and proper grazing management help to prevent the damage caused by frost action. The soils have a surface layer of silt loam, fine sandy loam, or silty clay loam. Available water capacity is moderate or high. Slopes range from 0 to 18 percent.

Soils in group B have limited growth and production potential because of droughtiness. Those in group B-1 are very deep or deep and are well drained or moderately well drained. They have a surface layer of loam, gravelly loam, or loamy fine sand. Available water capacity is low. These soils are sandy or loamy-skeletal in the subsoil. Slopes range from 0 to 12 percent.

Soils in group C are wet because of a seasonal high water table. Those in group C-1 are very deep and are somewhat poorly drained to very poorly drained. They have a surface layer of silt loam, silty clay loam, loam, fine sandy loam, or loamy fine sand. Available water capacity ranges from low to high. These soils normally respond well to a subsurface drainage system. Slopes range from 0 to 6 percent.

Soils in group C-2 are moderately deep to very deep and are somewhat poorly drained to very poorly drained. They have a surface layer of silty clay loam, silty clay, clay loam, loam, or silt loam. Available water capacity is low or moderate. A high seasonal high water table limits the rooting depth of deep-rooted forage plants. Some of these soils have bedrock at a depth that also restricts root penetration. Shallow-rooted species grow best in areas of these soils. Subsurface drains are used to lower the seasonal high water table. The effectiveness of a subsurface drainage system is typically limited by permeability of the subsoil, the depth to bedrock, or the landscape position of the soil. Because of the limited root zone, the soils in this group are better suited to forage species that do not have a taproot. Slopes range from 0 to 6 percent.

Soils in group C-3 are very deep and are very poorly drained or somewhat poorly drained. They are subject to occasional or frequent flooding. The flooding limits the use of these soils for pasture during periods of stream overflow, and sediment lowers the quality of the forage. The soils have a surface layer of silt loam. Available water capacity is high. Slopes range from 0 to 2 percent. Frost action may damage legumes. Including grasses in a seeding mixture and using proper grazing management methods help to prevent the damage caused by frost heaving. A seasonal high water table limits the rooting depth of forage plants. Shallow-rooted species grow best in areas of these soils. Subsurface drains are used to lower the seasonal high water table. The effectiveness of a subsurface drainage system is limited by the landscape position of the soils.

Soils in group D are organic soils. Those in group D-1 are very deep and are very poorly drained. They formed in organic material that is underlain by sandy deposits. Available water capacity is very high. Slopes are 0 or 1 percent.

Soils in group E are shallow or very shallow and are well drained to poorly drained. The rooting depth of plants grown in areas of these soils is restricted by bedrock between depths of 4 and 20 inches. The soils are droughty. They have a surface layer of silt loam or loam. Available water capacity is very low or low. Slopes range from 0 to 12 percent.

Soils in group F have a moderately deep root zone. The growth of climatically adapted plants is restricted in these soils to a depth of 20 to 40 inches. These soils are better suited to forage species that do not have a taproot.

Soils in group F-1 are moderately deep and are well drained or moderately well drained. They have a surface layer of very channery loam, channery loam, loamy sand, sandy loam, or silt loam. Available water capacity is very low to moderate. These soils are droughty but are suitable for warm-season grasses, such as switchgrass, big bluestem, indiangrass, and Caucasian bluestem. The soils respond favorably to additions of lime. Frequent applications may be needed to maintain an adequate pH level. The low pH of the subsoil in some of these soils can shorten the life of some deep-rooted legumes in the stand. Slopes range from 0 to 18 percent. Harrod silt loam, 0 to 1 percent slopes, frequently flooded, is in group F-1. The flooding limits the use of this soil for pasture during periods of stream overflow, and sediment lowers the quality of the forage.

Soils in group H-1 are not suited to pasture or hay because they have slopes of more than 40 percent.

The local office of the Natural Resources Conservation Service or the Ohio State University Extension can provide additional information about forage yields other than those shown in table 5.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 129,000 acres in Erie County, or 71 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the western part, mainly in general soil map units 1, 2, 4, 5, 7, 10, and 11, which are described under the heading "General Soil Map Units."

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 9. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Woodland Management and Productivity

Vegetation in the county at the time of the earliest land surveys was mostly hardwood forest. Vegetation types included mixed oak forest, beech forest, mixed mesophytic forest, elm-ash swamp forest, and prairie grassland (Gordon 1969). Only about 21,800 acres in the county remains forested. The forested areas are mainly on river bottoms and in small, scattered woodlots in the uplands (USDA, NRCS 1996). Most of the woodland has been harvested several times, and many wooded areas have been pastured. The condition of existing woodland varies depending on past management, soil types, and logging practices.

The soil properties at a specific site influence woodland management. The selection of the seedling species, the seedling survival rate, the windthrow hazard, the equipment limitation, and the potential for erosion are management concerns that are influenced by the soil type. The water-holding capacity, drainage, and slope of a soil affect plant competition and seedling mortality. The texture of the surface layer, organic matter content, slope, and drainage influence logging schedules, the equipment limitation, and damage sustained to the woodland environment during logging. Depth to the seasonal high water table or bedrock influences rooting depth, which affects windthrow and site productivity.

Soil type and plant species are related. Soils that are susceptible to ponding for part of the year commonly support stands of soft maple, bur oak, swamp white oak, and pin oak. The somewhat poorly drained, poorly drained, and very poorly drained soils are best suited to hydrophytic species, such as sycamore, swamp white oak, American elm, and pin oak. Moderately well drained and well drained soils support a greater variety of tree species, such as white pine, red oak, white oak, ash, hickory, basswood, walnut, yellow-poplar, sugar maple, beech, and cherry.

Income from the sale of timber is lower than that of other farm products; however, if properly managed and harvested, woodland on most soils in Erie County has the potential to provide income per acre through the periodic sale of timber that is similar to that of other agricultural products. Woodland provides wildlife habitat, serves as windbreaks, and has esthetic value. It also produces edible nuts, lumber, and fuelwood.

Information on woodland management is available from the Ohio Department of Natural Resources, Division of Forestry; the Ohio State University Extension; and the local office of the Natural Resources Conservation Service.

Table 10 can help woodland owners or forest managers plan the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *N*, snowpack. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and N.

In the table, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition (fig. 11).

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in this table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens.

Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service; the Ohio State University Extension; the Ohio Department of Natural Resources, Division of Forestry; or from a nursery.

Landscape Plants

The natural landscape of Erie County has been logged, grazed, and cropped since the early 1800s. Agricultural land users have drained most areas that are too wet for cropland. They have also mixed the surface layer with the upper part of the more clayey subsoil on eroded slopes. Lime has been added to maintain near neutral pH in the surface layer.

Information about present soil conditions and landscape plant needs will help the land user save money by reducing plant losses. The user should also know about possible maintenance costs. Drastically disturbed soils, such as Udorthents, loamy, 0 to 6 percent slopes, are not considered.

The soil-water-plant relationship is unique to every plant. It is affected by the position of the soil on the landscape, the texture (percent of sand, silt, and clay) of the surface layer and subsoil, natural drainage, available water capacity, and soil reaction (pH).

Much of the rainwater and snowmelt rapidly runs off of the higher, drier parts of the landscape, such as knolls, rises, and backslopes, and runs onto or into the lower, wetter areas, such as flat areas, depressions, drainageways, and flood plains. Some of this surface water on the higher, drier parts of the landscape soaks into the surface layer and subsoil, and some of it moves less rapidly downslope, along the surface layer contact with the subsoil. The rest of the water percolates slowly into the lower part of the subsoil and may eventually enter the subsoil in the lower, wetter areas. Therefore, much more water, along with any dissolved nutrients, is available for plant growth in the lower, wetter areas than in the higher, drier areas. If these lower, wetter areas are not drained or if old drainage systems are not maintained, these areas will become wetter for most of the year. Wetland plants are associated with areas that are wet for most of the year.

Figure 11.—A windbreak of conifers in an area of Cardington silt loam, 2 to 6 percent slopes.

If these areas are drained or if the old drainage systems are maintained, upland plants will become more dominant.

Soils in these areas are very poorly drained. Drainage systems help to remove excess water. These soils have a very high, high, or moderate available water capacity, and they are generally neutral or slightly acid (pH of 6.1 to 7.3) in the surface layer and subsoil.

Plants likely to grow well on these soils are wetland plants that tolerate ponding or flooding. Adrian muck, which is very strongly acid to slightly alkaline at a depth of 20 inches, is difficult to drain and is a natural wetland. Condit, Millgrove, Pewamo, and Weyers soils also support wetland plants in areas that are not drained.

Soils in the higher, drier areas are moderately well drained or well drained. They have a moderate, low, or very low available water capacity and are mostly neutral or acid in the surface layer and in the upper part of the subsoil unless they have been limed.

Plants likely to grow well on these soils are upland tree species and other plants that need about equal parts of air and water in the surface layer and the upper part of the subsoil. Some plants will not tolerate the low amount of air in a clayey subsoil. Other plants will not tolerate the very low available water capacity (droughtiness) in a very gravelly and sandy subsoil. A few plants need very acidic soils, which are not common in the county.

Soils in the higher, drier or more sloping areas are those in the Amanda, Belmore, Brecksville, Cardington, Chili, Conotton, Dekalb, Dunbridge, Ellsworth, Elnora, Fox, Milton, Oakville, Ogontz, Oshtemo, Rawson, Saylesville, Shinrock, Spinks, Tuscola, Wakeman, and Zurich series.

Somewhat poorly drained soils in flat areas and on low slopes are too dry in the summer to be considered lower, wetter soils but are too wet in the spring to be considered among the soils in the higher, drier areas. These soils have a low, moderate, or high available water capacity. They are neutral or acid in the surface layer and in the upper part of the subsoil unless they have been limed.

Plants likely to grow well on these soils must tolerate both wet and dry conditions in most years unless the soils are drained. Soils in these areas are those in the Bennington, Bixler, Del Rey, Elliott, Fulton, Haskins, Hornell, Jimtown, Kibbie, Mahoning, Mitiwanga, Orrville, Plumbrook, Randolph, and Rimer series.

New varieties of some plants have been developed in order to overcome some limitations. For example, Fraser fir, which is grown for Christmas tree production, cannot tolerate the wet, clayey subsoil common to Bennington and Mahoning soils; however, a new variety of Fraser fir grows well in areas of these soils.

Additional information regarding the suitability of selected plants to the planting site can be obtained from the local office of the Natural Resources Conservation Service; the Ohio State University Extension; the Ohio Department of Natural Resources, Division of Forestry; or from a nursery.

Recreation

Erie County has more recreational opportunities than many of the counties in northwestern Ohio. The Lake Erie shoreline provides extensive access to water-related activities, such as boating and fishing. The amusement park at Cedar Point provides entertainment opportunities that draw visitors from throughout Ohio. Kelleys Island State Park provides sites for seasonal, special events that are scheduled throughout the year for the public.

The city of Sandusky has several city parks and recreational facilities available for use by the public. In addition, there are many village parks throughout the county that have athletic fields, swimming pools, playground equipment, or shelter houses. There are also many public or private golf courses.

A wide variety of soils are used as recreational areas in the county; however, several of the county and village parks that are used for seasonal, outdoor activities are on flood plains.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In the table, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 15 and interpretations for dwellings without basements and for local roads and streets in table 14.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

The population of wildlife in Erie County has been adversely affected by extensive fall plowing, the elimination of fence rows, and the clearing of woodlots. A large portion of the wildlife areas in the county are wetland habitat. Erie County is one of the nine coastal counties in Ohio that border Lake Erie. Two rivers and many streams empty into the lake. Publicly managed wildlife areas and nature preserves provide excellent wetland wildlife habitat (fig. 12). They include Willow Point, Rest Haven, Sheldons Marsh, Old Woman Creek, and the National Estuarine Research Reserve. The National Aeronautics and Space Administration property in Perkins Township is the largest wildlife area in the county.

For information on managing or improving wildlife habitat, contact the Ohio Department of Natural Resources, Division of Wildlife; the Ohio State University Extension; or the local office of the Natural Resources Conservation Service.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing

Figure 12.—Endoaquents in the Rest Haven Wildlife Area. These soils, which are in the background, provide excellent habitat for wetland wildlife.

plant cover, or by promoting the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are foxtail, goldenrod, lambsquarter, pigweed, and eveningprimrose.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattails, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants, or both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, and mink.

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others 1979; National Research Council 1995; Tiner 1985; U.S. Army Corps of Engineers 1987). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register 1995). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in “Soil Taxonomy” (Soil Survey Staff 1999) and “Keys to Soil Taxonomy” (Soil Survey Staff 1990, 1996) and in the “Soil Survey Manual” (Soil Survey Division Staff 1993).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils in this survey area are specified in “Field Indicators of Hydric Soils in the United States” (Hurt, Whited, and Pringle 1996).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

The following map units meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council 1995; Hurt, Whited, and Pringle 1996).

AaA	Adrian muck, 0 to 1 percent slopes
AkA	Allis clay loam, 0 to 2 percent slopes
CmA	Colwood loam, 0 to 1 percent slopes
CnA	Colwood silt loam, bedrock substratum, 0 to 1 percent slopes
CoA	Condit silt loam, 0 to 1 percent slopes
EsA	Endoaquents, loamy, 0 to 1 percent slopes
FnA	Fluvaquents, silty, 0 to 1 percent slopes, frequently flooded
FrA	Fries silty clay loam, 0 to 1 percent slopes
GdA	Gilford fine sandy loam, 0 to 1 percent slopes
HoA	Holly silt loam, 0 to 1 percent slopes, occasionally flooded
JuA	Joliet silt loam, 0 to 1 percent slopes
MeA	Mermill silty clay loam, 0 to 1 percent slopes
MfA	Milford silty clay loam, 0 to 1 percent slopes
MgA	Millgrove loam, 0 to 1 percent slopes
MmA	Millsdale silty clay loam, 0 to 1 percent slopes
MrA	Miner silty clay loam, 0 to 1 percent slopes
MsA	Miner silt loam, bedrock substratum, 0 to 1 percent slopes
OmA	Olmsted loam, 0 to 1 percent slopes
PcA	Pewamo silty clay loam, 0 to 1 percent slopes
SaA	Sandusky loam, 0 to 1 percent slopes
TnA	Toledo silty clay loam, 0 to 1 percent slopes
ToA	Toledo silty clay, 0 to 1 percent slopes
TpA	Toledo silty clay, 0 to 1 percent slopes, ponded
WeA	Weyers silt loam, 0 to 1 percent slopes

Map units that are made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The following map units, in general, do not meet the definition of hydric soils because they do not have one of the hydric soil indicators. A portion of these map units, however, may include hydric soils. Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

AeA	Algiers silt loam, 0 to 2 percent slopes
BeA	Bennington loam, 0 to 2 percent slopes
BgA	Bennington silt loam, 0 to 2 percent slopes
BgB	Bennington silt loam, 2 to 6 percent slopes
BkA	Bixler loamy fine sand, 0 to 2 percent slopes
CaB	Cardington silt loam, 2 to 6 percent slopes
CbC2	Cardington silty clay loam, 6 to 12 percent slopes, eroded
CcA	Castalia very channery loam, 0 to 2 percent slopes
CcB	Castalia very channery loam, 2 to 6 percent slopes
DeA	Del Rey silt loam, 0 to 2 percent slopes
EcA	Elliott silt loam, bedrock substratum, 0 to 2 percent slopes
EdB	Ellsworth silt loam, 2 to 6 percent slopes
EdC2	Ellsworth silt loam, 6 to 12 percent slopes, eroded
FuA	Fulton silty clay loam, 0 to 2 percent slopes
had	Harrod silt loam, 0 to 1 percent slopes, frequently flooded
HkA	Haskins loam, 0 to 2 percent slopes
HpB	Hornell loam, 2 to 6 percent slopes
HrB	Hornell silt loam, 2 to 6 percent slopes
HsA	Hornell silty clay loam, 0 to 2 percent slopes
JtA	Jimtown loam, 0 to 2 percent slopes
KbA	Kibbie fine sandy loam, 0 to 2 percent slopes
MaA	Mahoning silt loam, 0 to 2 percent slopes
MaB	Mahoning silt loam, 2 to 6 percent slopes
MbB	Marblehead loam, 0 to 6 percent slopes
NoA	Nolin silt loam, 0 to 2 percent slopes, occasionally flooded
OpA	Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, occasionally flooded
OrA	Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, frequently flooded
PmA	Plumbrook fine sandy loam, 0 to 2 percent slopes
RaA	Randolph silt loam, 0 to 2 percent slopes
RcA	Rawson sandy loam, 0 to 2 percent slopes
RcB	Rawson sandy loam, 2 to 6 percent slopes
RgA	Rimer loamy fine sand, 0 to 2 percent slopes
ShB	Shinrock silt loam, 2 to 6 percent slopes
SkC2	Shinrock silty clay loam, 6 to 12 percent slopes, eroded
SkD2	Shinrock silty clay loam, 12 to 18 percent slopes, eroded
TuA	Tuscola fine sandy loam, 0 to 2 percent slopes
TuB	Tuscola fine sandy loam, 2 to 6 percent slopes

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 14 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 15 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

The table also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 15 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 15 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 16 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In the construction materials table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In this table, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Rock fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils or loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 17 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include the engineering index properties, physical and chemical properties, and pertinent soil and water features.

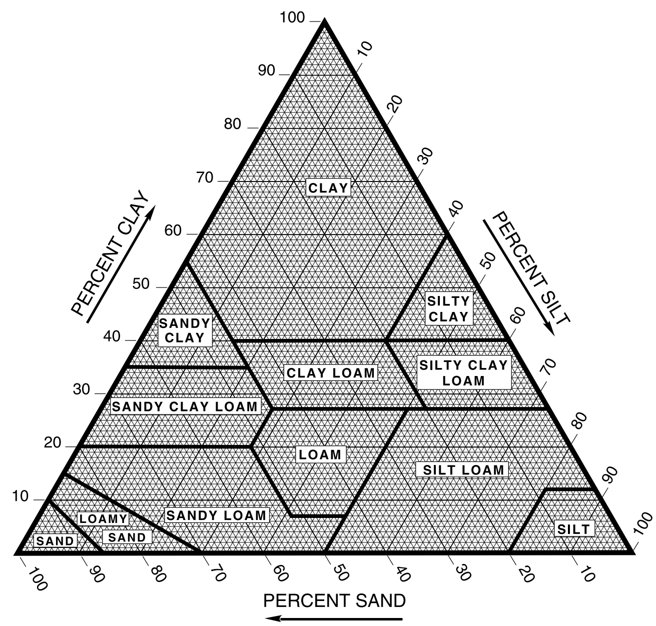


Figure 13.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 18 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 13). “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Tables 19a and 19b show estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 19a, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In this table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water and depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

Erosion factors are shown in table 19a as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Soil reaction is a measure of acidity or alkalinity, and as shown in table 19b, it is expressed as a range in pH values. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 19b, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Cation-exchange capacity is the total amount of extractable cations that can be held by the soil, expressed in terms of milliquivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations reduces the hazard of ground-water pollution.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Soil Features

Table 20 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Total subsidence is the result of a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures. A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to the formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 21 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top *(upper limit)* and base *(lower limit)* of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Depth is given to the nearest half foot. A saturated zone that lasts for less than a month is not considered a water table. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 21 indicates *surface water depth* and the *duration* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days.

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding. *Duration* is estimated. It is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Physical and Chemical Analyses of Selected Soils

Many of the soils in Erie County were sampled by the Soil Characterization Laboratory, School of Natural Resources, The Ohio State University, in Columbus, Ohio. The physical and chemical data obtained from the samples include particle-size distribution, reaction, organic matter content, calcium carbonate content, and extractable cations.

These data were used in classifying and correlating soils and in evaluating their behavior under various land uses. Six pedons were selected as representative of their respective series and are described in the section titled “Soil Series and Their Morphology.” These series and their laboratory identification numbers are ER-40, Marblehead; ER-42, Allis; ER-43, Ogontz; ER-44, Wakeman; ER-45, Plumbrook; and ER-46, Mitiwanga.

In addition to the data from Erie County, laboratory data are available from adjacent or nearby counties that have many of the same soils. These data and the data from Erie County are on file at the School of Natural Resources, The Ohio State University, in Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, in Columbus, Ohio; and the Ohio State NRCS Office in Columbus, Ohio.

Engineering Index Test Data

Table 22 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section “Soil Series and Their Morphology.” The soil samples were tested by the Ohio Department of Transportation, Division of Highways, Testing Laboratory, in Columbus, Ohio.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 23 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, active, mesic Typic Hapludalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the county is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. Pedons used in this publication were primarily described and documented as part of the Erie County modernization process. In certain circumstances, pedons from adjacent survey areas or from the site of the official series description (OSD) were utilized. In most cases, typical pedons from adjacent survey areas were used to provide consistent supporting data and documentation across survey area boundaries. In the case of OSDs, it was to transition toward the use of official series descriptions as part of a national trend in soil survey publications. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff 1975) and in “Keys to Soil Taxonomy” (Soil Survey Staff 1990, 1996). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Adrian Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow to moderately rapid in the organic material and rapid in the underlying sandy material
Parent material: Organic material overlying sandy deposits
Landform: Lake plains
Position on the landform: Closed depressions
Slope: 0 to 1 percent
Adjacent soils: Millgrove, Jimtown

Taxonomic classification: Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists

Typical Pedon

Adrian muck, 0 to 1 percent slopes; about 1 mile northeast of Berlin Heights, in Berlin Township; about 2,900 feet southwest of the intersection of Mason Road (County Road 13) and Humm Road (Township Road 134), along Humm Road, then 425 feet east; quadrangle 2; T. 5 N., R. 21 W.

Oa1—0 to 16 inches; muck, black (N 2/) broken face and rubbed; less than 5 percent fibers, rubbed and unrubbed (primarily herbaceous fibers); moderate medium and coarse granular structure; very friable; many fine and very fine roots; very strongly acid; clear wavy boundary.
Oa2—16 to 28 inches; muck, dark reddish brown (5YR 3/2) broken face and black (N 2/) rubbed; less than 5 percent fibers, unrubbed and rubbed (primarily herbaceous fibers); weak coarse subangular blocky structure; friable; many fine and very fine roots; strongly acid; clear smooth boundary.
Cg1—28 to 32 inches; dark gray (5Y 4/1) loamy sand; single grain; loose; few fine and very fine roots; many prominent dark reddish brown (5YR 3/2) organic stains in pores; moderately acid; clear wavy boundary.
Cg2—32 to 64 inches; gray (5Y 5/1) sand; single grain; loose; few very fine roots; common prominent reddish brown (5YR 4/4) iron and manganese stains in pores; moderately acid; clear wavy boundary.
Cg3—64 to 80 inches; dark gray (5Y 4/1) loamy sand; single grain; loose; slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the organic layer: 16 to 51 inches

Oa1 horizon:
Color—hue of 10YR or 7.5YR or is neutral; value of 2; chroma of 0 to 2
Texture—sapric material

Oa2 horizon:
Color—hue of 10YR, 7.5YR, or 5YR or is neutral; value of 2 or 3; chroma of 0 to 3
Texture—sapric material

Cg or C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 to 3
Texture—sand, loamy sand, fine sand, gravelly sand, gravelly loamy sand
Content of rock fragments—0 to 25 percent

Algiers Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the solum
Parent material: Alluvium overlying a buried soil
Landform: Lake plains
Position on the landform: Fans and toeslopes along depressions
Slope: 0 to 2 percent
Adjacent soils: Holly, Shinrock, Zurich

Taxonomic classification: Fine-loamy, mixed, superactive, nonacid, mesic Aquic Udifluvents

Typical Pedon

Algiers silt loam, 0 to 2 percent slopes; about 2 miles south of Huron, in Huron Township; about 1,200 feet north of the intersection of State Route 13 and Scheid Road (Township Road 12), along State Route 13, then 822 feet east; quadrangle 2; T. 6 N., R. 22 W.

Ap—0 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; dark grayish brown (10YR 4/2) unrubbed; weak medium and fine granular structure; friable; common fine and very fine roots; few very fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; moderately acid; clear wavy boundary.
C1—11 to 18 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; dark grayish brown (10YR 4/2) unrubbed; massive; friable; few very fine roots; few very fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; slightly acid; clear wavy boundary.

C2—18 to 31 inches; dark grayish brown (10YR 4/2) silt loam; massive; friable; few very fine roots; few 1/4- to 1/2-inch-thick lenses of yellowish brown (10YR 5/4) very fine sand; few very fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral; clear wavy boundary.

Ab—31 to 39 inches; black (10YR 2/1) silty clay loam; moderate medium and fine subangular blocky structure; firm; few very fine roots; common medium faint dark gray (10YR 4/1) iron depletions in the matrix; neutral; clear wavy boundary.

Bgb—39 to 51 inches; dark gray (5Y 4/1) silty clay loam; moderate medium and coarse angular blocky structure; firm; few very fine roots; common faint dark gray (5Y 4/1) coatings on faces of peds; few prominent dark brown (7.5YR 3/2) iron and manganese stains on faces of peds; few very fine prominent black (10YR 2/1) iron and manganese concretions in the matrix; neutral; gradual wavy boundary.

Cg1—51 to 78 inches; gray (10YR 6/1) silty clay loam; massive; firm; many medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral; clear wavy boundary.

Cg2—78 to 80 inches; gray (10YR 5/1) silt loam; massive; friable; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral.

Range in Characteristics

Thickness of the recent alluvium: 20 to 36 inches

A horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam
Content of rock fragments—0 to 5 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 or 3
Texture—silt loam, loam
Content of rock fragments—0 to 5 percent

Ab horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam, silty clay loam
Content of rock fragments—0 to 5 percent

Bgb horizon:
Color—hue of 10YR, 2.5Y, or 5Y or is neutral; value of 4 or 5; chroma of 0 to 2
Texture—silty clay loam, loam
Content of rock fragments— 0 to 5 percent

Cg horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 or 2
Texture—silt loam, silty clay loam, sandy loam
Content of rock fragments—0 to 5 percent

Allis Series

Depth class: Moderately deep
Drainage class: Poorly drained
Permeability: Slow or very slow
Parent material: Till or lacustrine deposits overlying shale
Landform: Ground moraines and lake plains
Position on the landform: Extensive flat areas, slight rises
Slope: 0 to 2 percent
Adjacent soils: Bennington, Condit, Fries, Hornell

Taxonomic classification: Fine, illitic, acid, mesic Typic Endoaquepts

Typical Pedon

Allis clay loam, 0 to 2 percent slopes; about 2 miles south of Vermilion, in Vermilion Township; about 2,350 feet north of the intersection of State Route 60 and Darrow Road (County Road 14), along State Route 60, then 1,585 feet west; quadrangle 1; T. 6 N., R. 20 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) clay loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; few fine and very fine roots; very strongly acid; abrupt smooth boundary.

BAg—6 to 9 inches; grayish brown (10YR 5/2) clay loam; weak fine and medium subangular blocky structure; firm; few very fine roots; common faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; few faint light brownish gray (10YR 6/2) clay depletions on faces of peds; common fine distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; extremely acid; clear wavy boundary.

Bg1—9 to 14 inches; grayish brown (10YR 5/2) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; few faint gray (10YR 5/1) clay depletions on faces of peds;

common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 1 percent rock fragments; very strongly acid; clear wavy boundary.

Bg2—14 to 22 inches; grayish brown (10YR 5/2) clay; moderate medium and fine subangular blocky structure; firm; few very fine roots; common faint gray (10YR 5/1) clay depletions on faces of peds; common medium distinct yellowish brown (10YR 5/4) and common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 1 percent rock fragments; extremely acid; clear wavy boundary.

Bg3—22 to 28 inches; gray (10YR 5/1) clay; weak coarse subangular blocky structure; firm; few very fine roots; few faint gray (10YR 5/1) clay depletions on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 3 percent shale fragments; extremely acid; abrupt wavy boundary.

2Cr—28 to 30 inches; weathered shale.

2R—30 to 32 inches; unweathered shale bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to shale bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 3 or 4, chroma of 2 to 4
Texture—clay loam
Content of rock fragments—0 to 15 percent

Bg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—clay loam, silty clay loam, silty clay, clay, the channery analogs of those textures
Content of rock fragments—0 to 35 percent

Amanda Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow in the lower part of the solum and in the substratum
Parent material: Till
Landform: Dissected areas on lake plains and ground moraines
Position on the landform: Backslopes, shoulders
Slope: 12 to 70 percent
Adjacent soils: Dekalb, Ellsworth, Tioga

Taxonomic classification: Fine-loamy, mixed, active, mesic Typic Hapludalfs

Typical Pedon

Amanda loam, in an area of Amanda-Dekalb-Rock outcrop association, 40 to 70 percent slopes; about 1 mile south of Birmingham, in Florence Township; about 1,600 feet south of the intersection of State Route 60 and Garfield Road (Township Road 18), along State Route 60, then 1,250 feet east; quadrangle 2; T. 5 N., R. 20 W.

Oe—1 inch to 0; partially decomposed leaf litter.

A—0 to 5 inches; brown (10YR 4/3) loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; many fine and medium roots; 5 percent rock fragments; strongly acid; clear wavy boundary.

BA—5 to 12 inches; yellowish brown (10YR 5/4) loam; weak fine and medium subangular blocky structure; friable; common medium and coarse roots; few faint brown (10YR 4/3) organic coatings on faces of peds; 5 percent rock fragments; strongly acid; clear wavy boundary.

BE—12 to 19 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; common medium and coarse roots; few faint brown (10YR 4/3) organic coatings and brown (10YR 5/3) coatings on faces of peds; 7 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—19 to 29 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; common faint dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; 10 percent rock fragments; strongly acid; gradual wavy boundary.

Bt2—29 to 38 inches; yellowish brown (10YR 5/4) clay loam; moderate medium and coarse subangular blocky structure; firm; few fine and medium roots; many faint dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bt3—38 to 46 inches; dark yellowish brown (10YR 4/4) loam; moderate medium and coarse subangular blocky structure; friable; few fine and medium roots; few distinct brown (7.5YR 4/4) clay films and coatings on faces of peds; 12 percent rock fragments; slightly acid; clear wavy boundary.

BCt—46 to 52 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; friable; few fine roots; very few distinct brown (7.5YR 4/4) clay films and coatings on faces of peds; 10 percent rock fragments; neutral; clear wavy boundary.

C—52 to 80 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; few coarse faint yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: Generally 40 to 70 inches but ranges to 34 inches in eroded pedons
Depth to carbonates: 40 to 70 inches

A or Ap horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 2 or 3
Texture—loam
Content of rock fragments—0 to 10 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—loam, clay loam, silty clay loam
Content of rock fragments—2 to 15 percent

C or Cg horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 2 to 4
Texture—loam, silt loam
Content of rock fragments—5 to 15 percent

Belmore Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the solum and rapid in the substratum
Parent material: Loamy deposits overlying stratified loamy, gravelly, and sandy material
Landform: Beach ridges on lake plains
Position on the landform: Summits, shoulders, backslopes
Slope: 2 to 6 percent
Adjacent soils: Milton, Bennington

Taxonomic classification: Fine-loamy, mixed, active, mesic Typic Hapludalfs

Typical Pedon

Belmore loam, 2 to 6 percent slopes; in York Township in Sandusky County, Ohio; about 248 feet north and 760 feet east of the southwest corner of sec. 16, T. 4 N., R. 17 E.

Ap—0 to 7 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium and fine granular structure; friable; common roots; 2 percent rock fragments; slightly acid; abrupt smooth boundary.
Bt1—7 to 12 inches; brown (7.5YR 5/4) clay loam; moderate medium and coarse subangular blocky structure; friable; few roots; few faint brown (7.5YR 5/4) clay bridging sand grains; 5 percent rock fragments; moderately acid; clear smooth boundary.
Bt2—12 to 17 inches; brown (7.5YR 4/4) gravelly clay loam; moderate coarse and medium subangular blocky structure; friable; few roots; common distinct dark reddish brown (5YR 3/4) clay films bridging sand grains; 20 percent rock fragments; slightly acid; clear smooth boundary.
Bt3—17 to 23 inches; brown (7.5YR 4/4) gravelly clay loam; weak fine subangular blocky structure; friable; few roots; common distinct dark reddish brown (5YR 3/4) clay films bridging sand grains; 15 percent rock fragments; slightly acid; clear smooth boundary.
Bt4—23 to 30 inches; brown (7.5YR 4/4) gravelly sandy clay loam; weak fine subangular blocky structure; friable; common distinct dark reddish brown (5YR 3/4) clay films bridging sand grains; 30 percent rock fragments; neutral; abrupt smooth boundary.
C1—30 to 47 inches; mixed grayish brown (10YR 5/2) and pale brown (10YR 6/3) gravelly loamy sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; 30 percent rock fragments; slightly effervescent; slightly alkaline; clear smooth boundary.
C2—47 to 56 inches; mixed grayish brown (10YR 5/2) and pale brown (10YR 6/3) sand; single grain; loose; few fine distinct yellowish brown (10YR 5/4) mottles; 5 percent rock fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C3—56 to 60 inches; brown (10YR 4/3) sandy loam; massive; friable; 3 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 55 inches
Depth to carbonates: 24 to 55 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—loam
Content of rock fragments—2 to 10 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4

Texture—loam, clay loam, sandy clay loam, the gravelly analogs of those textures
Content of rock fragments—5 to 35 percent

C or Cg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 4
Texture—loam, sandy loam, loamy sand, the gravelly or very gravelly analogs of those textures
Content of rock fragments—3 to 40 percent

The Belmore soils in this county are wetter than is defined as the range for the series. They have 2-chroma redoximorphic features within a depth of 40 inches. They classify as fine-loamy, mixed, active, mesic Oxyaquic Hapludalfs. This difference, however, does not significantly affect the use and management of the soils.

Bennington Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow in the substratum
Parent material: Till
Landform: Ground moraines and lake plains
Position on the landform: Flat areas, slight rises, knolls, backslopes, shoulders
Slope: 0 to 6 percent
Adjacent soils: Cardington, Condit, Pewamo

Taxonomic classification: Fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Bennington silt loam, 0 to 2 percent slopes; about 2 miles southwest of Parkertown, in Groton Township; about 2,045 feet east and 300 feet south of the intersection of Strecker Road (County Road 15) and State Route 269; quadrangle 4; T. 5 N., R. 24 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, brown (10YR 5/3) dry; weak fine granular structure; friable; common fine and medium roots; 2 percent rock fragments; strongly acid; abrupt wavy boundary.

BE—9 to 11 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium and fine granular structure; firm; common fine roots; few distinct light brownish gray (10YR 6/2) clay depletions on faces of peds; common faint brown (10YR 4/3) coatings on faces of peds; common fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; strongly acid; clear wavy boundary.

Bt—11 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films and common faint brown (10YR 5/3) coatings on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions and common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; strongly acid; clear wavy boundary.

Btg—16 to 25 inches; grayish brown (10YR 5/2) silty clay; moderate medium and coarse subangular blocky structure; firm; few fine roots; many faint dark grayish brown (10YR 4/2) clay films and grayish brown (10YR 5/2) coatings on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium faint brown (10YR 4/3) and common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

BCg—25 to 29 inches; grayish brown (10YR 5/2) silty clay loam; weak coarse subangular blocky structure; firm; few fine roots; many faint grayish brown (10YR 5/2) coatings on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium faint brown (10YR 4/3) and common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; 2 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

Cg—29 to 36 inches; grayish brown (10YR 5/2) silty clay loam; massive; firm; many faint light brownish gray (10YR 6/2) coatings on faces of vertical partings; common distinct black (10YR 2/1) iron and manganese stains on faces of vertical partings; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—36 to 48 inches; yellowish brown (10YR 5/4) clay loam; massive; firm; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—48 to 80 inches; brown (10YR 4/3) clay loam; massive; firm; few medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 25 to 50 inches
Depth to carbonates: 25 to 46 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—silt loam, loam
Content of rock fragments—0 to 5 percent

BE horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silty clay loam, silt loam
Content of rock fragments—0 to 5 percent

Bt and Btg horizons:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 to 6
Texture—silty clay loam, clay loam, silty clay, clay
Content of rock fragments above a depth of 20 inches—0 to 5 percent
Content of rock fragments below a depth of 20 inches—2 to 15 percent

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 6
Texture—clay loam, silty clay loam, silt loam, loam
Content of rock fragments—2 to 15 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—clay loam, silty clay loam, silt loam, loam
Content of rock fragments—2 to 15 percent

Bixler Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid in the sandy material and moderate in the stratified lacustrine deposits
Parent material: Sandy deposits overlying stratified lacustrine deposits
Landform: Lake plains
Position on the landform: Flat areas, rises, knolls, backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Colwood, Kibbie, Tuscola

Taxonomic classification: Loamy, mixed, active, mesic Aquic Arenic Hapludalfs

Typical Pedon

Bixler loamy fine sand, 0 to 2 percent slopes; in Milan Village, in Milan Township; about 1,400 feet east of U.S. Route 250 at the Huron County line, along the county line, then 300 feet north; quadrangle 4; T. 5 N., R. 22 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak very fine granular structure; very friable; few very fine roots; neutral; abrupt smooth boundary.

E1—10 to 17 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; few very fine roots; few distinct dark grayish brown (10YR 4/2) organic coatings in pores; common medium and coarse faint brown (10YR 5/3) iron depletions in the matrix; neutral; clear wavy boundary.

E2—17 to 27 inches; yellowish brown (10YR 5/4) loamy sand; weak medium and coarse subangular blocky structure; very friable; few very fine roots; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium prominent strong brown (7.5YR 4/6) masses that have accumulated iron and are in the matrix; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; neutral; clear wavy boundary.

Bt1—27 to 31 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; few faint dark yellowish brown (10YR 4/4) clay bridging between sand grains; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; few fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; neutral; abrupt wavy boundary.

Bt2—31 to 37 inches; brown (10YR 4/3) sandy loam; weak medium subangular blocky structure; friable; few faint brown (10YR 4/3) clay bridging between sand grains; few fine distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; neutral; abrupt smooth boundary.

2Btg—37 to 44 inches; grayish brown (10YR 5/2) silt loam; moderate medium subangular blocky structure; firm; strata of very fine sandy loam; common faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; common medium faint light brownish gray (10YR 6/2) iron depletions in the matrix; neutral; clear wavy boundary.

2Cg—44 to 53 inches; grayish brown (10YR 5/2) silt loam; massive with weak medium platy partings; friable; strata of fine sandy loam; few distinct black (10YR 2/1) iron and manganese stains on faces of plates; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; common medium faint light brownish gray (10YR 6/2) iron depletions; strongly effervescent; moderately alkaline; clear wavy boundary.

2C—53 to 80 inches; brown (10YR 5/3) loamy fine sand stratified with very fine sandy loam and silt loam; massive; very friable; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Combined thickness of the Ap and E horizons: 20 to 35 inches
Thickness of the solum: 28 to 55 inches

Ap horizon:
Color—hue of 10YR, value of 2 to 4, chroma of 1 to 3
Texture—loamy fine sand
Content of rock fragments—0 to 5 percent

E horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 to 6
Texture—loamy fine sand, fine sand
Content of rock fragments—0 to 5 percent

Bt or Btg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 6
Texture—fine sandy loam, loam, sandy loam

2Bt or 2Btg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 1 to 6
Texture—silt loam; thin strata of silty clay loam, loam, very fine sandy loam

2C or 2Cg horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 to 6; chroma of 0 to 6
Texture—stratified with individual layers of silt loam, very fine sandy loam, fine sandy loam, loamy fine sand, fine sand, very fine sand, silt, silty clay loam

Brecksville Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Parent material: Residuum derived from thin-bedded shale
Landform: Dissected ground moraines and lake plains
Position on the landform: Backslopes
Slope: 40 to 70 percent
Adjacent soils: Jimtown, Oshtemo, Tioga

Taxonomic classification: Fine-loamy, mixed, active, mesic Typic Dystrochrepts

Typical Pedon

Brecksville silt loam, 40 to 70 percent slopes; in Mayfield Village, in Cuyahoga County; North Chagrin Reservation of Cleveland Metropolitan Parks; about 315 feet north along SOM Center Road from the intersection of Highland Road, then 4,000 feet east.

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

BE—2 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak medium and fine subangular blocky structure; friable; many roots; common faint light yellowish brown (10YR 6/4) clay depletions on faces of peds; 5 percent rock fragments; very strongly acid; clear smooth boundary.

Bw1—6 to 14 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles (lithochromic); moderate medium and coarse subangular blocky structure; firm; common roots; 5 percent rock fragments; very strongly acid; abrupt smooth boundary.

Bw2—14 to 22 inches; light olive brown (2.5Y 5/4) silty clay loam; few fine distinct light olive brown (2.5Y 5/6) mottles (lithochromic); weak thin platy structure; firm; few roots; 8 percent fragments of shale; very strongly acid; clear smooth boundary.

BC—22 to 27 inches; light olive brown (2.5Y 5/4) channery silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles (lithochromic); weak thin platy structure; firm; few roots; 20 percent fragments of shale; very strongly acid; clear smooth boundary.

C—27 to 30 inches; light olive brown (2.5Y 5/4) channery silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles (lithochromic); massive; firm; 30 percent fragments of shale; very strongly acid; abrupt smooth boundary.

Cr—30 to 36 inches; olive brown (2.5Y 4/4), thin-bedded, weathered shale.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to shale bedrock: 20 to 40 inches

A horizon:
Color—hue of 10YR, value of 2 to 4, chroma of 1 or 2
Texture—silt loam
Content of rock fragments—0 to 10 percent

BE horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 3 or 4
Texture—silt loam
Content of rock fragments—0 to 10 percent

Bw horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 3 or 4
Texture—silty clay loam, silt loam, silty clay, the channery analogs of those textures
Content of rock fragments—5 to 25 percent

BC horizon:
Color—hue of 2.5Y or 5Y, value of 4 or 5, chroma of 3 or 4
Texture—silty clay loam, silty clay, the channery or very channery analogs of those textures
Content of rock fragments—5 to 40 percent

C horizon:
Color—hue of 2.5Y or 5Y, value of 4 or 5, chroma of 1 to 4
Texture—silty clay loam, silty clay, the channery or very channery analogs of those textures
Content of rock fragments—5 to 40 percent

Cardington Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow in the substratum
Parent material: Till
Landform: Ground moraines and lake plains
Position on the landform: Flat areas, slight rises, knolls, backslopes, shoulders, summits
Slope: 0 to 12 percent
Adjacent soils: Bennington, Condit, Pewamo

Taxonomic classification: Fine, illitic, mesic Aquic Hapludalfs

Typical Pedon

Cardington silt loam, 2 to 6 percent slopes; about 2 miles northeast of Bellevue, in Groton Township; about 3,100 feet east of the intersection of Potter Road (Township Road 98) and State Route 269, along Potter Road, then 1,000 feet north; quadrangle 4; T. 5 N., R. 24 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; few fine roots; mixed areas of yellowish brown (10YR 5/6) Bt1 material in the lower part; 2 percent rock fragments; strongly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; brown (10YR 5/3) silty clay; moderate medium and coarse subangular blocky structure; firm; few very fine roots; common faint brown (10YR 5/3) coatings and clay films on faces of peds; many coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine distinct gray (10YR 5/1) iron depletions in the matrix; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—15 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and coarse subangular blocky structure; firm; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common distinct grayish brown (10YR 5/2) and common faint brown (10YR 5/3) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; 5 percent rock fragments; slightly acid; clear wavy boundary.

BC—25 to 30 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium and coarse subangular blocky structure; firm; few faint brown (10YR 5/3) coatings on vertical faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; few distinct light gray (10YR 7/1) masses that have accumulated calcium carbonate and are on vertical faces of peds; common medium distinct dark gray (10YR 4/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

C—30 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; massive; firm; common medium distinct dark gray (10YR 4/1) iron depletions in the matrix; few fine prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; few distinct black (10YR 2/1) iron and manganese stains on faces of vertical partings; few distinct light gray (10YR 7/1) masses that have accumulated calcium carbonate and are on faces of vertical partings; 8 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 28 to 50 inches
Depth to carbonates: 25 to 45 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam, silty clay loam
Content of rock fragments—0 to 5 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silty clay, silty clay loam, clay loam, clay
Content of rock fragments above a depth of 20 inches—0 to 5 percent
Content of rock fragments below a depth of 20 inches—2 to 15 percent

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 to 6
Texture—clay loam, silty clay loam, loam, silt loam
Content of rock fragments—2 to 15 percent

C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—clay loam, silty clay loam, loam, silt loam
Content of rock fragments—2 to 15 percent

Castalia Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Rapid
Parent material: Beach or eolian deposits intermixed with glacially displaced limestone fragments overlying limestone or dolostone
Landform: Reefs on lake plains
Position on the landform: Flat areas, rises, backslopes, shoulders, summits
Slope: 0 to 18 percent
Adjacent soils: Joliet, Millsdale, Milton, Ritchey

Taxonomic classification: Loamy-skeletal, carbonatic, mesic Eutrochreptic Rendolls

Typical Pedon

Castalia very channery loam, 0 to 2 percent slopes; about 8 miles southwest of Sandusky, in Groton Township; about 300 feet south and 500 feet east of the intersection of Portland Road (County Road 32) and State Route 99; quadrangle 2; T. 5 N., R. 24 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) very channery loam, dark grayish brown (10YR 4/2) dry; strong fine granular structure; friable; many fine roots; 60 percent limestone channers 1 to 5 inches in diameter and 1/2 to 1 inch thick; slightly effervescent; slightly alkaline; abrupt smooth boundary.

Bw—8 to 16 inches; brown (7.5YR 4/4) extremely channery loam; weak fine granular structure; friable; many fine roots; 80 percent limestone channers 1 to 5 inches in diameter and 1/2 to 1 inch thick; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—16 to 24 inches; brown (10YR 4/3) extremely flaggy loam; massive; friable; common fine and medium roots; 90 percent limestone channers and flagstones 3 to 10 inches in length and 1/2 inch to 2 inches thick; fragments displaced slightly from original bedding; strongly effervescent; moderately alkaline; gradual irregular boundary.

R—24 to 26 inches; gray (10YR 5/1), unweathered limestone bedrock with vertical fractures 1 to 2 feet apart.

Range in Characteristics

Thickness of the solum: 10 to 25 inches
Depth to limestone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 2 or 3, chroma of 1 or 2
Texture—very channery loam
Content of rock fragments—35 to 80 percent

Bw horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value of 4 to 6; chroma of 3 to 6
Texture—the very channery or extremely channery analogs of loam, silt loam, fine sandy loam, sandy loam
Content of rock fragments—35 to 80 percent

C horizon:
Color—hue of 5YR, 7.5YR, or 10YR; value of 4 to 6; chroma of 3 to 6
Texture—the very channery, extremely channery, or extremely flaggy analogs of loam, silt loam, fine sandy loam, sandy loam
Content of rock fragments—50 to 90 percent

Chili Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Outwash deposits and beach deposits
Landform: Beach ridges on lake plains and on terraces
Position on the landform: Backslopes, shoulders, summits
Slope: 2 to 6 percent
Adjacent soils: Cardington, Oshtemo, Rawson

Taxonomic classification: Fine-loamy, mixed, active, mesic Typic Hapludalfs

Typical Pedon

Chili loam, loamy substratum, 2 to 6 percent slopes; about 1 mile south of Birmingham, in Florence Township; about 1,200 feet south of the intersection of State Route 60 and West Road (Township Road 62), along State Route 60, then 2,100 feet east; quadrangle 1; T. 5 N., R. 20 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate medium and fine granular structure; friable; many fine and very fine roots; 5 percent rock fragments; strongly acid; abrupt smooth boundary.

BE—9 to 14 inches; yellowish brown (10YR 5/4) loam; moderate medium and fine subangular blocky structure; friable; common very fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings and common faint yellowish brown (10YR 5/4) coatings on faces of peds; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—14 to 23 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint yellowish brown (10YR 5/4) clay films and coatings on faces of peds; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—23 to 32 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak coarse subangular blocky structure; friable; few very fine roots; common faint brown (10YR 4/3) clay films on sand grains and rock fragments; 20 percent rock fragments; strongly acid; clear wavy boundary.

BCt—32 to 41 inches; brown (10YR 4/3) gravelly coarse sandy loam; weak coarse subangular blocky structure; very friable; few very fine roots; few faint brown (10YR 4/3) clay films on sand grains and rock fragments; 30 percent rock fragments; strongly acid; clear wavy boundary.

C1—41 to 77 inches; brown (10YR 4/3) gravelly sandy loam; massive; friable; 25 percent rock fragments; moderately acid; clear wavy boundary.

C2—77 to 80 inches; yellowish brown (10YR 5/4) loam; common coarse faint brown (10YR 4/3) mottles; massive; friable; 5 percent rock fragments; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 80 inches

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 2 to 4
Texture—loam
Content of rock fragments—0 to 15 percent

BE horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4
Texture—loam
Content of rock fragments—0 to 15 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—sandy loam, loam, clay loam, sandy clay loam, the gravelly or very gravelly analogs of those textures
Content of rock fragments—15 to 50 percent

BC or BCt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—the gravelly or very gravelly analogs of loam, sandy loam, coarse sandy loam
Content of rock fragments—15 to 60 percent

C horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—sandy loam, loam, coarse sandy loam, the gravelly or very gravelly analogs of those textures
Content of rock fragments—5 to 60 percent

Colwood Series

Depth class: Very deep and deep
Drainage class: Very poorly drained and poorly drained
Permeability: Moderately slow in the solum
Parent material: Stratified lacustrine deposits; lacustrine deposits overlying shale in the bedrock substratum phase
Landform: Lake plains
Position on the landform: Extensive flat areas, drainageways, depressions
Slope: 0 to 1 percent
Adjacent soils: Kibbie, Tuscola

Taxonomic classification: Fine-loamy, mixed, active, mesic Typic Endoaquolls

Typical Pedon

Colwood loam, 0 to 1 percent slopes; about 3 miles northwest of Berlin Heights, in Berlin Township; about 4,200 feet north and 500 feet east of the intersection of Wikel Road (Township Road 127) and Mason Road (County Road 13); quadrangle 3; T. 5 N., R. 21 W.

Ap—0 to 11 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common fine and medium roots; few fine prominent reddish gray (5YR 5/2) iron and manganese concretions in the matrix; slightly acid; abrupt smooth boundary.

Bg1—11 to 22 inches; dark gray (10YR 4/1) loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint dark gray (10YR 4/1) coatings on faces of peds; common medium prominent olive brown (2.5Y 4/4) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few fine prominent reddish gray (5YR 5/2) iron and manganese concretions in the matrix; slightly acid; clear wavy boundary.

Bg2—22 to 33 inches; grayish brown (10YR 5/2) loam; moderate medium and coarse subangular blocky structure; friable; few very fine roots; common faint gray (10YR 5/1) coatings on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint gray (10YR 5/1) iron depletions in the matrix; few fine prominent reddish gray (5YR 5/2) iron and manganese concretions in the matrix; neutral; clear wavy boundary.

Bg3—33 to 43 inches; grayish brown (10YR 5/2) silty clay loam; moderate coarse subangular blocky structure; friable; few very fine roots; few faint grayish brown (10YR 5/2) iron depletions on faces of peds; many medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine prominent reddish gray (5YR 5/2) iron and manganese concretions in the matrix; neutral; clear wavy boundary.

BCg—43 to 53 inches; gray (10YR 6/1) silt loam; weak coarse subangular blocky structure; friable; many medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint gray (10YR 5/1) iron depletions in the matrix; common medium white (10YR 8/1) accumulations of calcium carbonate in the matrix; strongly effervescent; slightly alkaline; clear wavy boundary.

Cg1—53 to 73 inches; grayish brown (10YR 5/2), stratified fine sandy loam and loamy fine sand; massive; very friable; strata of silt loam; common coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; slightly effervescent; slightly alkaline; clear wavy boundary.

Cg2—73 to 80 inches; dark grayish brown (10YR 4/2) loamy sand; single grain; loose; common coarse distinct yellowish brown (10YR 5/6) masses in which iron has accumulated; 3 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to 54 inches
Depth to bedrock: more than 80 inches; 40 to 60 inches to shale in the bedrock substratum phase

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2

Texture—loam, silt loam

Bg horizon:
Color—hue of 7.5YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—loam, silt loam, clay loam, silty clay loam, fine sandy loam, very fine sandy loam

BCg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—loam, silt loam, clay loam, silty clay loam, fine sandy loam, very fine sandy loam

Cg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—silt loam; fine sandy loam; loamy fine sand; very fine sand; fine sand; strata of silty clay loam, loam, loamy sand
Content of rock fragments—0 to 3 percent

Condit Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Parent material: Till
Landform: Ground moraines
Position on the landform: Extensive flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Bennington, Cardington

Taxonomic classification: Fine, illitic, mesic Typic Epiaqualfs

Typical Pedon

Condit silt loam, 0 to 1 percent slopes; about 3 miles southwest of Berlin Heights, in Berlin Township; about 5,810 feet south of the intersection of Andresse Road (Township Road 136) and State Route 113 along Andresse Road, then 700 feet east; quadrangle 1; T. 5 N., R. 21 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; common fine and very fine roots; 2 percent rock fragments; moderately acid; clear wavy boundary.

BEg—10 to 14 inches; gray (10YR 5/1) silty clay loam; weak medium subangular blocky structure; firm; few fine and very fine roots; common faint light brownish gray (10YR 6/2) coatings on faces of peds; many medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; strongly acid; clear wavy boundary.

Btg1—14 to 23 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; many faint gray (10YR 5/1) clay films on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; very strongly acid; clear wavy boundary.

Btg2—23 to 35 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common faint gray (10YR 5/1) clay films on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium prominent yellowish brown (10YR 5/6) and common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; slightly acid; clear wavy boundary.

BCtg—35 to 45 inches; gray (10YR 5/1) silty clay loam; weak coarse subangular blocky structure; very firm; few faint gray (10YR 5/1) clay films on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/4) and few medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; neutral; clear wavy boundary.

Cg—45 to 71 inches; gray (10YR 5/1) silty clay loam; massive; very firm; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few fine distinct black (10YR 2/1) masses that have accumulated iron and manganese and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C—71 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; massive; very firm; common medium distinct gray (10YR 5/1) iron depletions in the matrix; few fine distinct black (10YR 2/1) masses that have accumulated iron and manganese and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 35 to 55 inches
Depth to carbonates: 35 to 55 inches

Ap horizon:
Color—hue of 10YR, value of 3 to 5, chroma of 1 or 2
Texture—silt loam
Content of rock fragments—0 to 3 percent

BEg horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—silty clay loam, silt loam
Content of rock fragments—0 to 3 percent

Btg horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 or 5; chroma of 0 to 2
Texture—silty clay loam, clay loam, subhorizons of silty clay
Content of rock fragments—2 to 10 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 6
Texture—silty clay loam, clay loam, silt loam, loam
Content of rock fragments—2 to 10 percent

Conotton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Rapid
Parent material: Beach deposits
Landform: Beach ridges
Position on the landform: Backslopes, shoulders, summits
Slope: 2 to 12 percent
Adjacent soils: Jimtown, Millgrove, Mitiwanga

Taxonomic classification: Loamy-skeletal, mixed, active, mesic Typic Hapludalfs

Typical Pedon

Conotton loam, 2 to 6 percent slopes; about 3 miles northeast of Berlin Heights, in Florence Township; about 1,050 feet east of the intersection of Mason Road (County Road 13) and Burrows Road (Township Road 79), along Burrows Road, then 135 feet north; quadrangle 3; T. 5 N., R. 20 W.

Ap—0 to 9 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; many fine and very fine roots; 10 percent rock fragments; very strongly acid; abrupt wavy boundary.

BE—9 to 11 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine and medium subangular blocky structure; friable; few fine and very fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings and common faint pale brown (10YR 6/3) coatings on faces of peds; 25 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—11 to 17 inches; brown (7.5YR 4/4) gravelly loam; moderate fine and medium subangular blocky structure; friable; few fine and very fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; 25 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—17 to 30 inches; brown (7.5YR 4/4) extremely gravelly sandy loam; moderate medium and coarse granular structure; friable; few very fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds and as clay bridging sand grains and rock fragments; 70 percent gravel and 10 percent cobbles; moderately acid; clear wavy boundary.

Bt3—30 to 39 inches; brown (10YR 4/3) gravelly coarse sandy loam; weak medium and coarse granular structure; very friable; few very fine roots; common distinct brown (7.5YR 4/4) clay films on faces of peds and as clay bridging sand grains and rock fragments; 15 percent gravel and 10 percent cobbles; slightly acid; clear irregular boundary.

BC—39 to 57 inches; brown (10YR 4/3) very gravelly loamy coarse sand; weak medium and coarse granular structure; very friable; few very fine roots; 40 percent pebbles and 15 percent cobbles; slightly acid; clear irregular boundary.

C—57 to 80 inches; brown (10YR 4/3) very gravelly loamy coarse sand; single grain; loose; 40 percent pebbles and 10 percent cobbles; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 80 inches

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 2 or 3
Texture—loam, gravelly loam
Content of rock fragments—10 to 35 percent

BE horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—gravelly loam, gravelly sandy loam
Content of rock fragments—10 to 35 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6

Texture—the gravelly, very gravelly, or extremely gravelly analogs of loam, sandy loam, coarse sandy loam
Content of rock fragments—25 to 80 percent

BC horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—the gravelly or very gravelly analogs of sandy loam, coarse sandy loam, loamy coarse sand
Content of rock fragments—20 to 60 percent

C horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 2 to 4
Texture—the gravelly, very gravelly, or extremely gravelly analogs of loamy coarse sand, coarse sand, loamy sand
Content of rock fragments—15 to 65 percent

Dekalb Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Rapid
Parent material: Sandstone residuum
Landform: Ground moraines and lake plains
Position on the landform: Backslopes, shoulders, summits
Slope: 2 to 70 percent
Adjacent soils: Amanda, Wakeman, Mitiwanga

Taxonomic classification: Loamy-skeletal, siliceous, subactive, mesic Typic Dystrochrepts

Typical Pedon

Dekalb channery loam, 2 to 6 percent slopes; about 2 miles east of Berlin Heights, in Berlin Township; about 550 feet west of the intersection of State Route 113 and Cable Road (Township Road 59), along State Route 113, then about 875 feet north; quadrangle 2; T. 5 N., R. 21 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) channery loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; common fine and very fine roots; 30 percent sandstone fragments; slightly acid; clear wavy boundary.
Bw1—9 to 16 inches; yellowish brown (10YR 5/4) very channery loam; weak medium and fine subangular blocky structure; friable; few very fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; 55 percent sandstone fragments; strongly acid; gradual wavy boundary.
Bw2—16 to 30 inches; yellowish brown (10YR 5/4) very channery sandy loam; weak fine and medium subangular blocky structure; friable; few very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in pores; 55 percent sandstone fragments; strongly acid; clear smooth boundary.
R—30 to 32 inches; fractured, unweathered sandstone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to sandstone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 2 or 3
Texture—channery loam, very channery loam
Content of rock fragments—15 to 60 percent

Bw horizon:
Color—hue of 7.5YR or 10YR, value of 5 or 6, chroma of 4 to 8
Texture—the channery or very channery analogs of loam, sandy loam, fine sandy loam
Content of rock fragments—15 to 60 percent

Del Rey Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Flat areas, slight rises
Slope: 0 to 2 percent
Adjacent soils: Milford, Saylesville, Shinrock

Taxonomic classification: Fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Del Rey silt loam, 0 to 2 percent slopes; about 2 miles northeast of Milan, in Milan Township; about 1,500 feet south of the intersection of Mason Road (County Road 13) and River Road (County Road 126), along River Road, then 60 feet west; quadrangle 2; T. 5 N., R. 22 W.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, very pale brown (10YR 7/3) dry; weak fine and very fine granular structure; friable; common very fine and fine roots; moderately acid; abrupt smooth boundary.

BE—11 to 15 inches; brown (10YR 5/3) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; many faint grayish brown (10YR 5/2) coatings on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine faint light brownish gray (10YR 6/2) iron depletions in the matrix; strongly acid; abrupt wavy boundary.

Bt1—15 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong coarse angular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; very strongly acid; clear wavy boundary.

Bt2—22 to 33 inches; dark yellowish brown (10YR 4/4) silty clay; moderate coarse and medium angular blocky structure; firm; few very fine roots; many distinct gray (10YR 5/1) clay films on faces of peds; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; moderately acid; gradual wavy boundary.

BC—33 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse subangular blocky structure; firm; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

Cg—46 to 80 inches; grayish brown (10YR 5/2) silt loam; massive; friable; many medium prominent strong brown (7.5YR 5/6) and common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 48 inches

Ap horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 1 to 3
Texture—silt loam

BE horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3
Texture—silty clay loam, silt loam

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 6
Texture—silty clay loam, silty clay

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 6

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 8
Texture—silt loam, silty clay loam

Dunbridge Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Sandy and loamy drift overlying limestone or dolostone bedrock
Landform: Reefs on lake plains
Position on the landform: Flat areas, slight rises, backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Castalia, Rawson, Ritchey

Taxonomic classification: Fine-loamy, mixed, active, mesic Mollic Hapludalfs

Typical Pedon

Dunbridge loamy sand, 0 to 2 percent slopes; about 2 miles southeast of Castalia, in Margaretta Township; about 950 feet south and 1,700 feet east of the intersection of Miller Road (Township Road 26) and Maple Avenue (Township Road 103); quadrangle 1; T. 6 N., R. 24 W.

Ap—0 to 9 inches; dark brown (10YR 3/3) loamy sand, grayish brown (10YR 5/2) dry; moderate fine granular structure; very friable; many fine and medium roots; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

BE—9 to 13 inches; yellowish brown (10YR 5/6) loamy sand; weak fine and medium subangular blocky structure; very friable; few fine and very fine roots; common distinct dark brown (10YR 3/3) organic coatings in root channels; 2 percent rock fragments; neutral; clear irregular boundary.

Bt1—13 to 19 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; firm; few fine and very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; 7 percent rock fragments; neutral; clear wavy boundary.

Bt2—19 to 23 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; firm; few fine and very fine roots; many faint dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; 10 percent rock fragments; neutral; clear wavy boundary.

2BC—23 to 29 inches; dark yellowish brown (10YR 4/4) very gravelly loam; weak medium subangular blocky structure; friable; few fine and very fine roots; 40 percent rock fragments (dominantly limestone with a few igneous pebbles); strongly effervescent; moderately alkaline; clear wavy boundary.

3R—29 to 31 inches; unweathered limestone bedrock.

Range in Characteristics

Thickness of the dark epipedon: 7 to 9 inches
Thickness of the solum: 20 to 40 inches
Depth to limestone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 2 or 3, chroma of 1 to 3
Texture—loamy sand
Content of rock fragments—1 to 15 percent

BE horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 to 6
Texture—fine sandy loam, loamy sand, sandy loam, sandy clay loam, clay loam, the gravelly analogs of those textures
Content of rock fragments—1 to 35 percent

Bt horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 4 to 6; chroma of 3 to 6
Texture—fine sandy loam, sandy loam, sandy clay loam, clay loam, the gravelly analogs of those textures
Content of rock fragments—1 to 35 percent

2BC horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4
Texture—the gravelly or very gravelly analogs of loam, clay loam
Content of rock fragments—15 to 40 percent

Elliott Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow or slow in the substratum
Parent material: Till overlying limestone
Landform: Lake plains
Position on the landform: Flat areas, slight rises, toeslopes near depressions
Slope: 0 to 2 percent
Adjacent soils: Cardington, Milton, Rawson

Taxonomic classification: Fine, illitic, mesic Aquic Argiudolls

Typical Pedon

Elliott silt loam, bedrock substratum, 0 to 2 percent slopes; about 3 miles southwest of Parkertown, in Groton Township; about 800 feet south of the intersection of State Route 269 and Knauss Road (Township Road 96), along State Route 269, then 395 feet west; quadrangle 4; T. 5 N., R. 24 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine and very fine roots; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

BE—11 to 15 inches; brown (10YR 5/3) silt loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings and common faint pale brown (10YR 6/3) coatings on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; moderately acid; clear wavy boundary.

Bt1—15 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine distinct very dark gray (10YR 3/1) iron and manganese concretions in the matrix; 5 percent rock fragments; moderately acid; clear wavy boundary.

Bt2—22 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and coarse subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; few fine distinct very dark gray (10YR 3/1) iron and manganese concretions in the matrix; 5 percent rock fragments; moderately acid; clear wavy boundary.

Bt3—31 to 41 inches; dark yellowish brown (10YR 4/4) clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films and coatings on faces of peds; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine distinct very dark gray (10YR 3/1) iron and manganese concretions in the matrix; 5 percent rock fragments; moderately acid; gradual wavy boundary.

BC—41 to 49 inches; brown (10YR 4/3) clay loam; weak coarse subangular blocky structure; firm; few faint dark grayish brown (10YR 4/2) clay films and coatings on faces of peds; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common fine distinct very dark gray (10YR 3/1) iron and manganese concretions in the matrix; 10 percent rock fragments; neutral; clear wavy boundary.

C—49 to 65 inches; brown (10YR 4/3) clay loam; massive; firm; common distinct gray (10YR 5/1) coatings on faces of vertical partings; few distinct light gray (10YR 7/1) coatings of calcium carbonate on faces of vertical partings; common medium distinct gray (10YR 5/1) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

2R—65 to 67 inches; unweathered limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 15 inches
Thickness of the solum: 25 to 50 inches
Depth to carbonates: 25 to 50 inches
Depth to limestone bedrock: 60 to 80 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam
Content of rock fragments—0 to 2 percent

BE or BEg horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4
Texture—silt loam, silty clay loam
Content of rock fragments—0 to 2 percent

Bt or Btg horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4
Texture—silty clay loam, silty clay, clay loam, clay
Content of rock fragments—0 to 10 percent

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—silty clay loam, clay loam
Content of rock fragments—1 to 10 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—silty clay loam, clay loam
Content of rock fragments—1 to 10 percent

Ellsworth Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow or very slow in the substratum
Parent material: Till
Landform: Ground moraines
Position on the landform: Backslopes, shoulders, summits
Slope: 2 to 12 percent
Adjacent soils: Amanda, Dekalb, Mahoning, Rawson

Taxonomic classification: Fine, illitic, mesic Aquic Hapludalfs

Typical Pedon

Ellsworth silt loam, 2 to 6 percent slopes; about 2 miles southeast of Birmingham, in Florence Township; about 4,875 feet south of the intersection of Garfield Road (Township Road 18) and Green Road (Township Road 2), along Green Road, then about 500 feet west; quadrangle 1; T. 5 N., R. 20 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; common fine and medium roots; 5 percent rock fragments; moderately acid; abrupt smooth boundary.

Bt1—8 to 14 inches; strong brown (7.5YR 5/6) silty clay loam; strong medium subangular blocky structure; firm; few fine roots; common prominent brown (10YR 5/3) clay films and coatings on faces of peds; few medium prominent grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct brown (7.5YR 4/4) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—14 to 21 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium subangular blocky structure; firm; few fine and very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; common distinct dark grayish brown (10YR 4/2) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; few medium distinct dark grayish brown (10YR 4/2) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; few medium distinct black (10YR 2/1) iron and manganese concretions in the matrix; 10 percent rock fragments; moderately acid; clear wavy boundary.

BCt—21 to 30 inches; brown (10YR 4/3) silty clay loam; moderate medium and coarse subangular blocky structure; firm; common faint brown (10YR 4/3) clay films and dark grayish brown (10YR 4/2) coatings on faces of peds; few medium faint dark grayish brown (10YR 4/2) iron depletions in the matrix; few distinct light gray (10YR 7/2) masses that have accumulated calcium carbonate and are in the matrix; 10 percent rock fragments; neutral; gradual wavy boundary.

C1—30 to 49 inches; brown (10YR 4/3) clay loam; massive; firm; common medium prominent strong brown (7.5YR 4/6) masses that have accumulated iron and are in the matrix; common distinct light gray (10YR 7/2) masses that have accumulated calcium carbonate and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—49 to 68 inches; brown (10YR 4/3) clay loam; massive; firm; common medium distinct brown (7.5YR 4/2) iron depletions in the matrix; many medium prominent dark reddish brown (5YR 3/3) masses that have accumulated iron and are in the matrix; common distinct light gray (10YR 7/2) masses that have accumulated calcium carbonate and are in the matrix; 10 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3—68 to 80 inches; dark yellowish brown (10YR 4/4) clay loam; massive; firm; common medium prominent strong brown (7.5YR 4/6) masses that have accumulated iron and are in the matrix; common distinct light gray (10YR 7/2) masses that have accumulated calcium carbonate and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 28 to 46 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam
Content of rock fragments—0 to 10 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silty clay loam, clay loam, silty clay, clay
Content of rock fragments—2 to 10 percent

BCt or BC horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silty clay loam, clay loam
Content of rock fragments—2 to 10 percent

C or Cg horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—clay loam, silty clay loam
Content of rock fragments—2 to 10 percent

Elnora Series

Depth class: Very deep and deep
Drainage class: Moderately well drained
Permeability: Rapid; rapid or moderately rapid in the substratum in the bedrock substratum phase
Parent material: Sandy lacustrine deposits; sandy lacustrine deposits overlying shale in the bedrock substratum phase
Landform: Lake plains
Position on the landform: Rises, backslopes, shoulders, summits
Slope: 0 to 4 percent
Adjacent soils: Gilford, Plumbrook, Spinks, Tuscola

Taxonomic classification: Mixed, mesic Aquic Udipsamments

Typical Pedon

Elnora loamy fine sand, 0 to 4 percent slopes; about 2 miles northeast of Milan, in Milan Township; about 5,200 feet northeast of the intersection of Jeffries Road (County Road 128) and Diehl Road (Township Road 190), along Jeffries Road, then 1,900 feet south; quadrangle 1; T. 5 N., R. 22 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; few very fine roots; very strongly acid; abrupt smooth boundary.

Bw1—10 to 19 inches; yellowish brown (10YR 5/6) loamy fine sand; weak coarse subangular blocky structure; very friable; few very fine roots; few prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common coarse distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few medium prominent black (10YR 2/1) iron and manganese concretions in the matrix; moderately acid; clear wavy boundary.

Bw2—19 to 31 inches; yellowish brown (10YR 5/4) loamy fine sand; weak coarse subangular blocky structure; very friable; few very fine roots; common prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common coarse faint brown (10YR 5/3) iron depletions in the matrix; common coarse distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; common medium distinct black (10YR 2/1) iron and manganese concretions in the matrix; moderately acid; gradual wavy boundary.

Cg1—31 to 42 inches; light brownish gray (10YR 6/2) loamy fine sand; single grain; loose; few very fine roots; common coarse faint brown (10YR 5/3) and many coarse distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; moderately acid; gradual wavy boundary.

Cg2—42 to 50 inches; gray (10YR 6/1) loamy fine sand: single grain; loose; strata of fine sandy loam; common coarse distinct dark yellowish brown (10YR 4/4) and many coarse prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; strongly acid; clear wavy boundary.

Cg3—50 to 80 inches; dark grayish brown (10YR 4/2) loamy fine sand; single grain; loose; many coarse faint gray (10YR 5/1) iron depletions in the matrix; common coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; moderately acid.

Range in Characteristics

Thickness of the solum: 20 to 52 inches

Depth to bedrock: Dominantly more than 80 inches; 40 to 60 inches to shale in the bedrock substratum phase

Ap horizon:

Color—hue of 10YR, value of 3 to 5, chroma of 2 or 3

Texture—loamy fine sand

Bw horizon:

Color—hue of 7.5YR, 10YR, or 2.5Y; value of 4 to 6; chroma of 3 to 8

Texture—loamy fine sand, fine sand

Content of rock fragments—0 to 1 percent

C or Cg horizon:

Color—hue of 5YR to 5Y or is neutral; value of 3 to 6; chroma of 0 to 4

Texture—loamy fine sand, fine sand; channery or very channery fine sandy loam in the bedrock substratum phase

Content of rock fragments—0 to 5 percent; 0 to 50 percent in the bedrock substratum phase

Fox Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate in the solum and rapid or very rapid in the substratum

Parent material: Beach deposits

Landform: Beach ridges on lake plains

Position on the landform: Backslopes, shoulders, summits

Slope: 2 to 6 percent

Adjacent soils: Dunbridge, Elnora, Spinks

Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludalfs (fig. 14)

Typical Pedon

Fox loam, 2 to 6 percent slopes; about 3 miles south of Castalia, in Margaretta Township; about 100 feet north of the intersection of State Route 269 and Mason Road (County Road 13), along State Route 269, then 1,500 feet west; quadrangle 4; T. 5 N., R. 24 W.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; many fine and very fine roots; 5 percent rock fragments; neutral; clear wavy boundary.

BE—5 to 11 inches; brown (10YR 5/3) sandy loam; weak fine subangular blocky structure; friable; many fine and very fine roots; many faint dark grayish brown (10YR 4/2) organic coatings; few medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; neutral; clear wavy boundary.

Bt1—11 to 18 inches; yellowish brown (10YR 5/4) loam; moderate fine and medium subangular

Figure 14.—A profile of Fox loam, 2 to 6 percent slopes. Note the tonguing of Bt material into the underlying sand and gravel.

blocky structure; friable; common fine and very fine roots; common distinct brown (7.5YR 4/4) clay films on faces of peds and bridging sand grains; 5 percent rock fragments; neutral; clear wavy boundary.

Bt2—18 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (7.5YR 4/4) clay films on faces of peds; 10 percent rock fragments; neutral; clear wavy boundary.

Bt3—22 to 28 inches; brown (7.5YR 4/4) clay loam; strong fine and medium subangular blocky structure; firm; few very fine roots; common distinct brown (7.5YR 4/2) clay films on faces of peds; 10 percent rock fragments; neutral; clear irregular boundary.

2BC—28 to 32 inches; dark brown (7.5YR 3/4) very gravelly sandy loam; weak fine subangular blocky structure; friable; few very fine roots; 50 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

2C1—32 to 61 inches; yellowish brown (10YR 5/4) very gravelly sand; single grain; loose; few very fine roots; 40 percent pebbles and 20 percent cobbles; strongly effervescent; moderately alkaline; gradual irregular boundary.

2C2—61 to 80 inches; light gray (10YR 7/2) stratified very gravelly sand and very cobbly sand; single grain; loose; 45 percent pebbles and 35 percent cobbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 40 inches
Depth to carbonates: 24 to 40 inches

A horizon:
Color—hue of 10YR, value of 3, chroma of 2; hue of 10YR, value of 4, chroma of 2 or 3 in cultivated pedons
Texture—loam
Content of rock fragments—0 to 15 percent

BE horizon:
Color—hue of 10YR, value of 5, chroma of 3 or 4
Texture—sandy loam, loam
Content of rock fragments—0 to 15 percent

Bt horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 3 to 5; chroma of 3 or 4
Texture—loam, clay loam, the gravelly analogs of those textures
Content of rock fragments—0 to 30 percent

2BC horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 3 or 4
Texture—sandy loam, coarse sandy loam, the gravelly or very gravelly analogs of those textures
Content of rock fragments—5 to 50 percent

2C horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 7, chroma of 2 to 4
Texture—the gravelly, very gravelly, and extremely gravelly and the cobbly, very cobbly, and

extremely cobbly analogs of sand or coarse sand
Content of rock fragments—20 to 80 percent

Fries Series

Depth class: Moderately deep
Drainage class: Very poorly drained
Permeability: Slow
Parent material: Till or lacustrine deposits overlying shale
Landform: Lake plains
Position on the landform: Extensive flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Allis, Milford, Pewamo,

Taxonomic classification: Fine, illitic, mesic Typic Endoaquolls

Typical Pedon

Fries silty clay loam, 0 to 1 percent slopes; 0.7 mile east of Bogart, in Huron Township; 1,320 feet east of the intersection of Galloway Road and Bogart Road, then 500 feet north of Bogart Road, at the edge of a golf course.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; firm; many fine roots; 1 percent rock fragments; moderately acid; abrupt smooth boundary.

AB—10 to 14 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate medium subangular blocky structure; very firm; common fine roots; common fine faint dark grayish brown (10YR 4/2) masses that have accumulated iron and are in the matrix; 1 percent rock fragments; moderately acid; clear wavy boundary.

Bg—14 to 23 inches; grayish brown (10YR 5/2) clay; moderate medium angular blocky structure; very firm; few fine roots; many distinct dark gray (10YR 4/1) coatings on faces of peds; common medium prominent yellowish brown (10YR 5/8) masses that have accumulated iron and are in the matrix; moderately acid; gradual wavy boundary.

BC—23 to 28 inches; yellowish brown (10YR 5/8) clay loam; weak coarse angular blocky structure; very firm; few fine roots; many prominent gray (10YR 5/1) coatings on faces of peds; many coarse prominent grayish brown (10YR 5/2) iron depletions in the matrix; 1 percent rock fragments; moderately acid; clear smooth boundary.

2Cr—28 to 30 inches; gray (5Y 5/1), thin-bedded, weathered shale that can be dug with difficulty with a spade; many coarse prominent yellowish brown (10YR 5/8) masses in which iron has accumulated.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 18 inches
Thickness of the solum: 20 to 40 inches
Depth to shale bedrock: 20 to 40 inches

Ap and AB horizons:
Color—hue of 10YR or 2.5Y or is neutral; value of 2 or 3; chroma of 0 to 2
Texture—silty clay loam
Content of rock fragments—0 to 5 percent

Bg horizon:
Color—hue of 10YR, 2.5Y, or 5Y or is neutral; value of 4 or 5; chroma of 0 to 2
Texture—clay, silty clay, clay loam, silty clay loam
Content of rock fragments—0 to 10 percent

BC or Bw horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 to 8
Texture—clay loam, silty clay loam, silty clay, clay
Content of rock fragments—1 to 10 percent

Fulton Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow or very slow in the substratum
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Slight rises, flat areas
Slope: 0 to 2 percent
Adjacent soils: Toledo, Sandusky, Shinrock

Taxonomic classification: Fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Fulton silty clay loam, 0 to 2 percent slopes; about 1 mile east of Whites Landing, in Margaretta Annex; about 1,000 feet north and 10 feet west of the southeast corner of sec. 34, T. 6 N., R. 17 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure parting to weak fine granular; firm; common fine roots; mixed areas of dark yellowish brown (10YR 4/6) Bt1 material in the lower part; neutral; abrupt wavy boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; very firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; neutral; clear wavy boundary.

Bt2—16 to 29 inches; dark yellowish brown (10YR 4/4) silty clay; moderate coarse subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; neutral; gradual wavy boundary.

Bt3—29 to 36 inches; dark yellowish brown (10YR 4/4) silty clay; weak coarse subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and common distinct dark grayish brown (10YR 4/2) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; slightly effervescent in the lower part; slightly alkaline; clear wavy boundary.

BC—36 to 47 inches; dark yellowish brown (10YR 4/6) silty clay; weak medium subangular blocky structure; firm; common distinct gray (10YR 5/1) coatings on faces of vertical partings; many medium prominent gray (10YR 5/1) iron depletions in the matrix; many coarse distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; few light gray (10YR 7/2) masses that have accumulated calcium carbonate and are in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—47 to 80 inches; dark yellowish brown (10YR 4/6) silty clay; massive; firm; many medium prominent gray (10YR 5/1) iron depletions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to carbonates: 24 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 or 2
Texture—silty clay loam

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—silty clay, clay

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—silty clay, clay

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 6
Texture—silty clay, clay, silty clay loam

Gilford Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid in the lower part of the solum and in the substratum
Parent material: Loamy and sandy deposits
Landform: Lake plains
Position on the landform: Flat areas, drainageways, depressions
Slope: 0 to 1 percent
Adjacent soils: Elnora, Plumbrook

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Endoaquolls

Typical Pedon

Gilford fine sandy loam, 0 to 1 percent slopes; about 1 mile south of Avery, in Milan Township; about 1,250 feet west of the intersection of Strecker Road (County Road 15) and U.S. Route 250 along Strecker Road, then about 2,470 feet south; quadrangle 4; T. 5 N., R. 22 W.

Ap—0 to 9 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak medium and fine granular structure; friable; common fine and very fine roots; slightly acid; clear wavy boundary.

A—9 to 12 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak medium and fine granular structure; friable; few fine and very fine roots; slightly acid; clear wavy boundary.

Bg1—12 to 21 inches; dark gray (10YR 4/1) fine sandy loam; moderate medium subangular blocky structure; friable; few fine and very fine roots; common faint dark gray (10YR 4/1) coatings and very dark gray (10YR 3/1) organic coatings on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; few faint very dark gray (10YR 3/1) krotovinas; slightly acid; clear wavy boundary.

Bg2—21 to 32 inches; gray (10YR 5/1) fine sandy loam; weak medium and coarse subangular blocky structure; friable; few very fine roots; common faint dark gray (10YR 4/1) and gray (10YR 5/1) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few faint very dark gray (10YR 3/1) krotovinas; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; slightly acid; clear wavy boundary.

BCg—32 to 44 inches; grayish brown (10YR 5/2) loamy fine sand; weak coarse subangular blocky structure; very friable; few very fine roots; many coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few faint very dark gray (10YR 3/1) krotovinas; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral; gradual wavy boundary.

Cg1—44 to 58 inches; dark grayish brown (2.5Y 4/2) loamy fine sand; single grain; loose; common medium distinct dark gray (10YR 4/1) iron depletions in the matrix; common medium prominent dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; neutral; gradual wavy boundary.

Cg2—58 to 70 inches; dark gray (10YR 4/1) loamy fine sand; single grain; loose; slightly effervescent; slightly alkaline; gradual wavy boundary.

Cg3—70 to 80 inches; dark gray (10YR 4/1) sand; single grain; loose; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the solum: 30 to 44 inches
Depth to carbonates: 40 to 60 inches

Ap or A horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—fine sandy loam
Content of rock fragments—0 to 3 percent

Bg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—fine sandy loam, sandy loam
Content of rock fragments—0 to 3 percent

BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—loamy fine sand, loamy sand
Content of rock fragments—0 to 3 percent

Cg or C horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 3
Texture—loamy fine sand, loamy sand, sand, coarse sand, fine sand
Content of rock fragments—0 to 3 percent

Harrod Series

Depth class: Moderately deep
Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Alluvium overlying limestone
Landform: Flood plains
Position on the landform: Flat areas
Slope: 0 to 1 percent
Adjacent soils: Holly, Orrville

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Fluvaquentic Hapludolls

Typical Pedon

Harrod silt loam, 0 to 1 percent slopes, frequently flooded; about 0.5 mile east of Westminster, in Auglaize Township, Allen County, Ohio; about 1,440 feet north and 1,550 feet east of the southwest corner of sec. 17, T. 4 S., R. 8 E.

A—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine and very fine subangular blocky structure; friable; many fine and very fine and common medium roots; few very fine white (10YR 8/1) soft masses of calcium carbonate; very slightly effervescent; slightly alkaline; clear smooth boundary.

Bw1—11 to 14 inches; dark grayish brown (10YR 4/2) loam; moderate fine and medium subangular blocky structure; friable; common medium, fine, and very fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; very few fine prominent reddish brown (5YR 4/4) masses that have accumulated iron and manganese and are throughout the horizon; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw2—14 to 19 inches; dark grayish brown (10YR 4/2) loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common fine and very fine roots; common fine distinct yellowish brown (10YR 5/6) and common fine prominent brown (7.5YR 4/4) masses that have accumulated iron and are in the matrix; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; very few fine distinct black (10YR 2/1) masses that have accumulated iron and manganese and are throughout the horizon; slightly effervescent; moderately alkaline; clear wavy boundary.

Bw3—19 to 27 inches; dark grayish brown (10YR 4/2) loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; common fine distinct yellowish brown (10YR 5/6) and few prominent reddish brown (5YR 4/4) masses that have accumulated iron and are in the matrix; few faint gray (10YR 5/1) iron depletions on faces of peds; very few fine distinct black (10YR 2/1) masses that have accumulated iron and manganese and are throughout the horizon; 4 percent limestone fragments; slightly effervescent; moderately alkaline; clear wavy boundary.

Bg—27 to 31 inches; gray (10YR 5/1) sandy clay loam; weak medium and coarse subangular blocky structure; friable; very few fine distinct brown (7.5YR 4/4) masses that have accumulated iron and are throughout the horizon; 2 percent angular limestone channers; 9 percent subangular limestone fragments; slightly effervescent; moderately alkaline; abrupt smooth boundary.

2R—31 inches; unweathered limestone bedrock.

Range in Characteristics:

Thickness of the solum: 20 to 40 inches
Depth to limestone bedrock: 20 to 40 inches

A or Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam
Content of rock fragments—0 to 7 percent

Bw horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—silt loam or loam in the upper part; sandy loam ranging to clay loam in the lower part
Content of rock fragments—0 to 5 percent in the upper part and 0 to 15 percent in the lower part

Bg horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—silt loam, loam, sandy loam
Content of rock fragments— 0 to 15 percent

Haskins Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the loamy material and slow or very slow in the underlying material
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Landform: Ground moraines and lake plains
Position on the landform: Slight rises, flat areas, footslopes
Slope: 0 to 2 percent
Adjacent soils: Bennington, Condit

Taxonomic classification: Fine-loamy, mixed, active, mesic Aeric Epiaqualfs

Typical Pedon

Haskins loam, 0 to 2 percent slopes; about 2 miles south of Florence, in Florence Township; about 600 feet south and 2,100 feet east of the intersection of Florence-Wakeman Road (County Road 61) and Burr Road (Township Road 60); quadrangle 4; T. 5 N., R. 20 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, light gray (10YR 7/2) dry; weak fine and medium granular structure; friable; many fine and very fine roots; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

BE—10 to 14 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few very fine roots; many distinct light brownish gray (10YR 6/2) clay depletions on faces of peds; common medium distinct brown (10YR 5/3) and light brownish gray (10YR 6/2) iron depletions in the matrix; 2 percent rock fragments; strongly acid; clear wavy boundary.

Btg—14 to 22 inches; grayish brown (10YR 5/2) loam; moderate medium subangular blocky structure; firm; few very fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and common fine distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; moderately acid; clear wavy boundary.

Bt—22 to 32 inches; dark yellowish brown (10YR 4/4) loam; weak coarse subangular blocky structure; friable; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many distinct dark grayish brown (10YR 4/2) coatings on faces of peds; common medium distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.

2C1—32 to 52 inches; brown (10YR 4/3) clay loam; massive; firm; common distinct gray (10YR 5/1) coatings on faces of vertical partings; few distinct light gray (10YR 7/1) calcium carbonate coatings on faces of vertical partings; common coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; 2 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C2—52 to 80 inches; dark yellowish brown (10YR 4/4) clay loam; massive; very firm; few distinct gray (10YR 5/1) coatings on faces of vertical partings; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 25 to 55 inches
Depth to carbonates: 25 to 40 inches
Depth to the 2B or 2C horizon: 20 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—loam
Content of rock fragments—0 to 10 percent

BE or BEg horizon:
Color—hue of 10YR or 2.5Y, value of 5 or 6, chroma of 2 to 6
Texture—loam, sandy loam, fine sandy loam
Content of rock fragments—0 to 10 percent

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 6
Texture—loam, clay loam, sandy clay loam, the gravelly analogs of those textures
Content of rock fragments—0 to 20 percent

2B horizon (if it occurs):
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—clay, silty clay, clay loam, silty clay loam
Content of rock fragments—0 to 10 percent

2C or 2Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—clay loam, silty clay loam
Content of rock fragments—0 to 10 percent

Holly Series

Depth class: Very deep
Drainage class: Very poorly drained and poorly drained
Permeability: Moderate or moderately slow in the solum and moderate or moderately rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Flat areas, depressions, abandoned stream meanders
Slope: 0 to 1 percent
Adjacent soils: Cardington, Nolin, Orrville

Taxonomic classification: Fine-loamy, mixed, active, nonacid, mesic Typic Fluvaquents

Typical Pedon

Holly silt loam, 0 to 1 percent slopes, occasionally flooded; about 1 mile south of Florence, in Florence Township; about 1,125 feet north and 300 feet east of the intersection of Florence-Wakeman Road (County Road 61) and Harmon Road (Township Road 19); quadrangle 4; T. 5 N., R. 20 W.

A—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; many medium and coarse roots; common prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; moderately acid; clear wavy boundary.

Bg1—8 to 15 inches; dark gray (10YR 4/1) silt loam; weak medium subangular blocky structure; friable; common medium and fine roots; common faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; common prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few fine faint very dark gray (10YR 3/1) iron and manganese concretions in the matrix; moderately acid; clear wavy boundary.

Bg2—15 to 22 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; friable; common medium and fine roots; many faint grayish brown (10YR 5/2) coatings on faces of peds; few prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; few fine faint very dark gray (10YR 3/1) iron and manganese concretions in the matrix; strongly acid; clear wavy boundary.

Bg3—22 to 30 inches; gray (10YR 5/1) silt loam; weak medium and coarse subangular blocky structure; friable; few fine and very fine roots; common faint grayish brown (10YR 5/2) coatings on faces of peds; common prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; few fine faint very dark gray (10YR 3/1) iron and manganese concretions in the matrix; moderately acid; clear wavy boundary.

Cg—30 to 47 inches; grayish brown (10YR 5/2) loam; massive; friable; few very fine roots; common fine prominent yellowish red (5YR 4/6) iron and manganese concretions in the matrix; moderately acid; clear wavy boundary.

C—47 to 56 inches; strong brown (7.5YR 4/6) sandy loam; massive; friable; few very fine roots; common medium prominent light brownish gray (10YR 6/2) iron depletions in the matrix; common medium prominent dark reddish brown (5YR 3/3) iron and manganese concretions in the matrix; strongly acid; clear wavy boundary.

C'g—56 to 80 inches; light brownish gray (10YR 6/2) sandy loam; massive; friable; few very fine roots in the upper part; few fine prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 44 inches

A or Ap horizon:
Color—hue of 10YR, value of 2 to 4, chroma of 1 or 2
Texture—silt loam
Content of rock fragments—0 to 10 percent

Bg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—silt loam, loam, silty clay loam, sandy loam
Content of rock fragments—0 to 15 percent

Cg or C horizon:
Color—hue of 10YR or 7.5YR or is neutral; value of 4 to 6; chroma of 0 to 6
Texture—silt loam, loam, sandy loam, the gravelly analogs of those textures
Content of rock fragments—0 to 25 percent

Hornell Series

Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Permeability: Slow or very slow
Parent material: Till or lacustrine deposits overlying shale
Landform: Lake plains
Position on the landform: Flat areas, rises, backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Allis, Fries

Taxonomic classification: Fine, illitic, acid, mesic Aeric Endoaquepts

Typical Pedon

Hornell silty clay loam, 0 to 2 percent slopes; about 2 miles south of Bloomingville, in Oxford Township; about 750 feet south of the intersection of Wood Road (Township Road 30) and Patten Tract Road (County Road 43), along Patten Tract Road, then 1,150 feet west; quadrangle 3; T. 5 N., R. 23 W.

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; moderate medium and fine granular structure; friable; many medium and fine roots; 3 percent rock fragments; strongly acid; clear smooth boundary.

Bw—12 to 19 inches; pale brown (10YR 6/3) silty clay loam; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; common faint light brownish gray (10YR 6/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint light brownish gray (10YR 6/2) iron depletions in the matrix; 10 percent rock fragments (mostly shale); very strongly acid; clear wavy boundary.

BCg—19 to 24 inches; light brownish gray (10YR 6/2) channery silty clay loam; weak medium platy structure; friable; few fine and very fine roots; common faint gray (10YR 6/1) coatings on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint gray (10YR 6/1) iron depletions in the matrix; 15 percent rock fragments and 40 percent soft,

weathered shale fragments; very strongly acid; clear wavy boundary.
2Cr—24 to 28 inches; weathered shale.
2R—28 to 30 inches; thin-bedded shale bedrock.

Range in Characteristics

Thickness of the solum: 17 to 40 inches
Depth to shale bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 3 or 4, chroma of 2 or 3
Texture—silty clay loam, silt loam, loam
Content of rock fragments—0 to 5 percent

Bg or Bw horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 6, chroma of 1 to 8
Texture—silty clay loam, silty clay, clay, the channery analogs of those textures
Content of rock fragments—1 to 35 percent

BC or BCg horizon:
Color—hue of 7.5YR to 2.5Y, value of 3 to 6, chroma of 2 to 6
Texture—silty clay loam, silty clay, the channery or very channery analogs of those textures
Content of rock fragments—1 to 35 percent

C or Cg horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 3 to 6, chroma of 2 to 6
Texture—silty clay loam, silty clay, the channery or very channery analogs of those textures
Content of rock fragments—10 to 60 percent

Jimtown Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part of the subsoil and moderately rapid in the substratum
Parent material: Loamy deposits
Landform: Stream terraces, beach ridges, lake plains
Position on the landform: Flat areas, rises, footslopes
Slope: 0 to 2 percent
Adjacent soils: Bennington, Haskins, Millgrove

Taxonomic classification: Fine-loamy, mixed, active, mesic Aeric Endoaqualfs

Typical Pedon

Jimtown loam, 0 to 2 percent slopes; about 2 miles east of Berlin Heights, in Florence Township; about 2,435 feet east of the intersection of Main Road (County Road 17) and Wright Road (Township Road 130), along Main Road, then about 690 feet south; quadrangle 2; T. 5 N., R. 20 W.

Ap—0 to 9 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium and fine granular structure; friable; few very fine and fine roots; 5 percent rock fragments; strongly acid; clear smooth boundary.
BE—9 to 14 inches; brown (10YR 5/3) loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint grayish brown (10YR 5/2) coatings on faces of peds; few distinct brown (10YR 4/3) organic coats on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; strongly acid; clear wavy boundary.
Btg—14 to 27 inches; light brownish gray (10YR 6/2) clay loam; moderate coarse subangular blocky structure; friable; few very fine roots; few faint light brownish gray (10YR 6/2) clay films on faces of peds; common distinct brown (7.5YR 4/4) clay bridging; many distinct black (10YR 2/1) iron and manganese stains on faces of peds; many coarse prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; strongly acid; gradual wavy boundary.
BCt—27 to 51 inches; brown (10YR 4/3) gravelly sandy loam; weak coarse subangular blocky structure; friable; pockets of loam; few very fine roots; few distinct brown (7.5YR 4/4) clay bridging sand grains and gravel; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium faint yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 20 percent rock fragments; strongly acid; gradual wavy boundary.
Cg1—51 to 65 inches; dark grayish brown (10YR 4/2) stratified loam, gravelly loam, and coarse sandy loam; massive; friable; common medium faint brown (10YR 4/3) masses that have accumulated iron and are in the matrix; few medium faint gray (10YR 5/1) iron depletions in the matrix; 5 percent rock fragments in the loam and coarse sandy loam strata and 25 percent rock fragments in the gravelly loam; moderately acid; gradual wavy boundary.
Cg2—65 to 80 inches; dark grayish brown (10YR 4/2) coarse sandy loam; massive; very friable; common

medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; slightly acid.

Range in Characteristics

Thickness of the solum: 30 to 51 inches

Ap horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 1 to 3
Texture—loam
Content of rock fragments—0 to 15 percent

BE horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—loam
Content of rock fragments—0 to 15 percent

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—loam, clay loam, sandy clay loam, the gravelly or very gravelly analogs of those textures
Content of rock fragments—0 to 30 percent in the upper part and 15 to 50 percent in the lower part

BCt or BCtg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—loam, sandy loam, loamy sand, the gravelly or very gravelly analogs of those textures
Content of rock fragments—5 to 60 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 4
Texture—loam, sandy loam, loamy sand, the gravelly or very gravelly analogs of those textures
Content of rock fragments—5 to 60 percent

Joliet Series

Depth class: Shallow
Drainage class: Poorly drained
Permeability: Moderate
Parent material: Loamy drift overlying limestone
Landform: Reefs on lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Castalia, Marblehead, Millsdale, Ritchey

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Endoaquolls

Typical Pedon

Joliet silt loam, 0 to 1 percent slopes; about 2 miles southeast of Parkertown, in Groton Township; about 1,600 feet east of the intersection of Strecker Road (County Road 15) and State Route 4 along Strecker Road, then 80 feet south; quadrangle 1; T. 5 N., R. 24 W.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, very dark grayish brown (10YR 3/2) dry; moderate medium and fine granular structure; friable; many fine and very fine roots; few fine distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.
Bg—8 to 14 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; common very fine roots; common distinct black (10YR 2/1) organic coatings on faces of peds; 2 percent rock fragments; neutral; abrupt smooth boundary.
2R—14 to 16 inches; fractured unweathered limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 12 inches
Thickness of the solum: 10 to 20 inches
Depth to limestone bedrock: 10 to 20 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam
Content of rock fragments—0 to 15 percent

Bg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 3 to 5; chroma of 0 to 2
Texture—loam, silt loam, clay loam, silty clay loam
Content of rock fragments—0 to 15 percent

Kibbie Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Stratified loamy and silty glaciofluvial deposits
Landform: Lake plains and deltas
Position on the landform: Extensive flat areas and slight rises
Slope: 0 to 2 percent
Adjacent soils: Bixler, Colwood, Tuscola

Taxonomic classification: Fine-loamy, mixed, active, mesic Aquollic Hapludalfs

Typical Pedon

Kibbie fine sandy loam, 0 to 2 percent slopes; about 3 miles northwest of Berlin Heights, in Berlin Township; about 1,000 feet east and 2,600 feet north of the intersection of Wikel Road (Township Road 127) and Mason Road (County Road 13), quadrangle 4; T. 5 N., R. 21 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common fine and very fine roots; neutral; clear wavy boundary.

Bt1—9 to 19 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; many distinct grayish grown (10YR 5/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) iron and manganese stains on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few distinct very dark grayish brown (10YR 3/2) krotovinas; neutral; clear wavy boundary.

Bt2—19 to 26 inches; yellowish brown (10YR 5/6) loam; moderate medium and coarse subangular blocky structure; friable; pockets of fine sandy loam; few fine and very fine roots; many distinct grayish grown (10YR 5/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) iron and manganese stains on faces of peds; many medium distinct grayish brown (10YR 5/2) and common coarse distinct brown (10YR 5/3) iron depletions in the matrix; few distinct very dark grayish brown (10YR 3/2) krotovinas; neutral; clear wavy boundary.

Bt3—26 to 33 inches; yellowish brown (10YR 5/4) silty clay loam; moderate coarse subangular blocky structure parting to weak medium platy; friable; few fine and very fine roots; common distinct grayish grown (10YR 5/2) clay films on faces of peds; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common coarse light gray (10YR 5/1) masses that have accumulated calcium carbonate and are in the matrix; neutral; gradual wavy boundary.

BCg—33 to 42 inches; grayish brown (2.5Y 5/2), stratified silt loam and silty clay loam; weak coarse platy structure; friable; common medium prominent yellowish brown (10YR 5/6) and brown (7.5YR 4/4) masses that have accumulated iron and are in the matrix; common coarse light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; slightly effervescent; slightly alkaline; clear wavy boundary.

Cg—42 to 80 inches; grayish brown (10YR 5/2) silt loam stratified with fine sandy loam; massive; friable; common coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint gray (10YR 5/1) iron depletions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the dark epipedon: 7 to 9 inches
Thickness of the solum: 24 to 48 inches
Depth to carbonates: 24 to 48 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3
Texture—fine sandy loam

Bt horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 3 to 6
Texture—loam, clay loam, silty clay loam, silt loam

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 5 or 6, chroma of 2 to 4
Texture—silt loam, silty clay loam, loam, fine sandy loam, loamy fine sand, fine sand

C or Cg horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 2 to 4
Texture—silt loam, loam, fine sandy loam, loamy fine sand, fine sand

The Kibbie soils in this county are wetter than is defined as the range for the series. They have redoximorphic features of 2 or less on more than 50 percent of the ped faces. They classify as fine-loamy, mixed, active, mesic Udollic Endoaqualfs. This difference, however, does not significantly affect the use and management of the soils.

Mahoning Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow or very slow
Parent material: Till
Landform: Ground moraines
Position on the landform: Flat areas, slight rises, backslopes, shoulders, summits
Slope: 0 to 6 percent

Adjacent soils: Condit, Ellsworth, Miner

Taxonomic classification: Fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Mahoning silt loam, 0 to 2 percent slopes; about 2 miles south of Birmingham, in Florence Township; about 500 feet west of the intersection of Denman Road (Township Road 65) and Green Road (Township Road 2), along Denman Road, then 700 feet north; quadrangle 1; T. 5 N., R. 20 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine and medium roots; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; 2 percent rock fragments; moderately acid; clear wavy boundary.

BE—9 to 11 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; many distinct light brownish gray (10YR 6/2) clay depletions on faces of peds; few prominent black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; 2 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—11 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; firm; common fine and medium and few coarse roots; many distinct light brownish gray (10YR 6/2) clay films on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct gray (10YR 6/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—20 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; firm; few fine and medium roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct grayish brown (10YR 5/2) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct gray (10YR 6/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; very strongly acid; clear wavy boundary.

Bt3—29 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct grayish brown (10YR 5/2) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; slightly acid; clear wavy boundary.

C—40 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; massive; firm; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few white (10YR 8/1) masses that have accumulated calcium carbonate and are in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 28 to 44 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 or 3
Texture—silt loam
Content of rock fragments—0 to 5 percent

BE horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 3 to 6
Texture—silt loam, silty clay loam
Content of rock fragments—0 to 5 percent

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—silty clay loam, clay loam, silty clay, clay
Content of rock fragments—2 to 10 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—silty clay loam, clay loam
Content of rock fragments—2 to 10 percent

Marblehead Series

Depth class: Very shallow
Drainage class: Somewhat excessively drained
Permeability: Moderate
Parent material: Loamy deposits overlying limestone or dolostone
Landform: Reefs on lake plains

Position on the landform: Rises, backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Castalia, Joliet, Ritchey

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Hapludolls

Typical Pedon

Marblehead loam, 0 to 6 percent slopes; about 2 miles east of Castalia, in Margaretta Township; from the intersection of State Routes 101 and 412 with Bradshar Road, about 1,500 feet southwest along State Routes 101 and 412, then 300 feet north; T. 6 N., R. 24 W.

A1—0 to 6 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate medium and fine granular structure; friable; common fine and very fine roots; 2 percent rock fragments; slightly acid; clear wavy boundary.
A2—6 to 8 inches; very dark grayish brown (10YR 3/2) gravelly loam; weak medium and fine granular structure; friable; few very fine roots; 20 percent rock fragments; slightly acid; abrupt smooth boundary.
2R—8 to 10 inches; limestone bedrock; widely spaced vertical fractures typically at intervals of 30 to 40 feet.

Range in Characteristics

Thickness of the solum: 4 to 10 inches
Depth to limestone bedrock: 4 to 10 inches

A horizon:
Color—hue of 7.5YR or 10YR, value of 2 or 3, chroma of 1 or 2
Texture—loam, silt loam, fine sandy loam, the gravelly or channery analogs of those textures
Content of rock fragments—2 to 20 percent

Mermill Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate in the loamy material and slow or very slow in the underlying material
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Landform: Lake plains and ground moraines
Position on the landform: Extensive flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Bennington, Haskins, Jimtown, Millgrove and Pewamo

Taxonomic classification: Fine-loamy, mixed, active, mesic Mollic Epiaqualfs

Typical Pedon

Mermill silty clay loam, 0 to 1 percent slopes; about 3 miles southwest of Huron, in Huron Township; about 2,000 feet west and 1,100 feet north of the intersection of Fox Road (Township Road 11) and Camp Road (Township Road 121); quadrangle 4; T. 6 N., R. 22 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium and fine granular structure; friable; common fine and very fine roots; few fine distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; slightly acid; abrupt smooth boundary.
BEg—10 to 13 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate medium and fine subangular blocky structure; friable; few very fine roots; common faint gray (10YR 5/1) coatings and very dark gray (10YR 3/1) organic coatings on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.
Btg1—13 to 19 inches; grayish brown (10YR 5/2) clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; many medium distinct yellowish brown (10YR 5/6) and common medium faint brown (10YR 5/3) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.
Btg2—19 to 24 inches; grayish brown (10YR 5/2) loam; moderate coarse and medium subangular blocky structure; friable; few very fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; many medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; neutral; abrupt wavy boundary.
2Btg3—24 to 33 inches; gray (10YR 6/1) silty clay; moderate coarse subangular blocky structure; firm; few very fine roots; common faint gray (10YR 5/1) clay films on faces of peds; common prominent reddish brown (5YR 5/3) and common distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium prominent dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix;

2 percent rock fragments; neutral; gradual wavy boundary.

2BCg—33 to 41 inches; gray (10YR 5/1) silty clay loam; weak coarse prismatic structure; firm; common faint gray (10YR 5/1) coatings on vertical faces; few distinct light gray (10YR 7/2) calcium carbonate coatings on faces of peds; common medium distinct brown (10YR 4/3) and common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg1—41 to 62 inches; dark grayish brown (10YR 4/2) silty clay; massive; firm; few distinct light gray (10YR 7/2) calcium carbonate coatings on faces of peds; common coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common coarse faint gray (10YR 5/1) iron depletions in the matrix; 2 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

2Cg2—62 to 80 inches; grayish brown (10YR 5/2) clay loam; massive; firm; common coarse faint gray (10YR 5/1) iron depletions in the matrix; common coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 14 inches
Thickness of the solum: 24 to 48 inches
Depth to 2B or 2C horizon: 20 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam
Content of rock fragments—0 to 10 percent

BEg horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2
Texture—silty clay loam, loam, sandy clay loam
Content of rock fragments—0 to 10 percent

Btg horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—loam, clay loam, sandy clay loam
Content of rock fragments—0 to 10 percent

2Btg and 2BCg horizons:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—clay loam, silty clay loam, silty clay, clay
Content of rock fragments—0 to 10 percent

2C or 2Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 4
Texture—clay loam, silty clay loam, silty clay, clay
Content of rock fragments—0 to 10 percent

The Mermill soils in this county have a thicker surface layer than is defined as the range for the series. They classify as fine-loamy, mixed, active, mesic Typic Argiaquolls. This difference, however, does not significantly affect the use and management of the soils.

Milford Series

Depth class: Very deep
Drainage class: Poorly drained and very poorly drained
Permeability: Moderately slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Slope: 0 to 1 percent
Adjacent soils: Del Rey, Shinrock, Toledo

Taxonomic classification: Fine, mixed, superactive, mesic Typic Endoaquolls

Typical Pedon

Milford silty clay loam, 0 to 1 percent slopes; about 1 mile northwest of Huron, in Huron Township; about 2,300 feet south of the intersection of Laurel Road and U.S. Route 6 along Laurel Road, then 700 feet east; quadrangle 2; T. 6 N., R. 22 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few very fine roots; slightly acid; abrupt wavy boundary.

Bg1—10 to 14 inches; grayish brown (10YR 5/2) silty clay loam; moderate medium angular blocky structure; firm; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings and many distinct dark gray (10YR 4/1) coatings on faces of peds; few medium distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; slightly acid; clear wavy boundary.

Bg2—14 to 26 inches; grayish brown (10YR 5/2) silty clay; moderate medium prismatic structure parting to moderate medium and coarse angular blocky; firm; few very fine roots; few distinct very dark gray (10YR 3/1) organic coatings and common faint gray (10YR 5/1) coatings on faces of peds; common medium distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and few medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; slightly acid; gradual wavy boundary.

Bg3—26 to 35 inches; grayish brown (10YR 5/2) silty clay loam; moderate medium prismatic structure parting to moderate medium and coarse angular blocky; firm; few very fine roots; common faint gray (10YR 5/1) coatings on faces of peds; common medium distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; slightly acid; gradual wavy boundary.

BCg—35 to 54 inches; gray (10YR 5/1) silty clay loam; weak coarse angular blocky structure; firm; common faint gray (10YR 5/1) coatings on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; neutral; gradual wavy boundary.

Cg—54 to 80 inches; gray (10YR 5/1) silty clay loam; massive; firm; strata of silt loam; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 15 inches
Thickness of the solum: 36 to 60 inches

Ap horizon:
Color—hue of 10YR or is neutral; value of 2 or 3; chroma of 0 to 2
Texture—silty clay loam

Bg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—silty clay loam, silty clay, clay loam

BCg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—silty clay loam, clay loam

Cg horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—silty clay loam; clay loam; strata of silt loam, very fine sandy loam, fine sandy loam

Millgrove Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate or moderately rapid in the substratum
Parent material: Beach deposits
Landform: Lake plains
Position on the landform: Drainageways, depressions
Slope: 0 to 1 percent
Adjacent soils: Jimtown, Mermill, Oshtemo

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Argiaquolls

Typical Pedon

Millgrove loam, 0 to 1 percent slopes; about 2 miles northeast of Berlin Heights, in Berlin Township; about 750 feet north and 2,050 feet west of the intersection of Thorpe Road (Township Road 86) and Frailey Road (Township Road 137); quadrangle 2; T. 5 N., R. 21 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; many fine and very fine roots; 2 percent rock fragments; strongly acid; abrupt smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; common fine and very fine roots; common fine distinct brown (10YR 5/3) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; moderately acid; abrupt wavy boundary.

BA—13 to 18 inches; dark gray (10YR 4/1) clay loam; moderate coarse subangular blocky structure; friable; few very fine roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; few medium distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct brown (10YR 5/3) and few fine prominent brown (7.5YR 4/4) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; neutral; clear wavy boundary.

Btg1—18 to 27 inches; gray (10YR 5/1) clay loam; moderate medium and coarse subangular blocky structure; friable; few very fine roots; many faint gray (10YR 5/1) clay films and common faint dark gray (10YR 4/1) coatings on faces of peds; few medium distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few very dark gray (10YR 3/1) krotovinas; 2 percent rock fragments; neutral; clear wavy boundary.

Btg2—27 to 41 inches; gray (10YR 5/1) clay loam; moderate medium subangular blocky structure; friable; pockets of loam and sandy loam; few very fine roots; many faint gray (10YR 5/1) clay films and coatings on faces of peds; few medium distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few faint very dark gray (10YR 3/1) krotovinas; 2 percent rock fragments; neutral; gradual wavy boundary.

Cg1—41 to 58 inches; gray (10YR 5/1) loam; massive; friable; few very fine roots; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few distinct very dark gray (10YR 3/1) krotovinas; 10 percent rock fragments; neutral; clear wavy boundary.

Cg2—58 to 73 inches; dark gray (10YR 4/1) gravelly coarse sandy loam; massive; friable; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 20 percent rock fragments; slightly acid; clear wavy boundary.

2Cg3—73 to 77 inches; gray (10YR 5/1) fine sandy loam; massive; friable; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; slightly acid; clear wavy boundary.

2Cg4—77 to 80 inches; dark gray (5Y 4/1) very fine sandy loam; massive; friable; slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 18 inches
Thickness of the solum: 28 to 55 inches
Depth to carbonates: 32 to 80 inches

Ap and A horizons:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—loam
Content of rock fragments—2 to 15 percent

BA horizon:
Color—hue of 10YR, value of 4, chroma of 1 or 2
Texture—clay loam
Content of rock fragments—2 to 15 percent

Btg horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 or 5; chroma of 1 or 2
Texture—loam, clay loam, sandy clay loam, the gravelly analogs of those textures
Content of rock fragments—2 to 20 percent

Cg or C horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 to 3
Texture—loam, sandy loam, coarse sandy loam, the gravelly analogs of those textures
Content of rock fragments—2 to 30 percent

2Cg or 2C horizon:
Color—hue of 10YR to 5Y, value of 4 to 5, chroma of 1 to 3
Texture—fine sandy loam, loamy fine sand, very fine sandy loam
Content of rock fragments—0 to 2 percent

Millsdale Series

Depth class: Moderately deep
Drainage class: Very poorly drained
Permeability: Moderately slow
Parent material: Till or lacustrine deposits overlying limestone or dolostone
Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Castalia, Joliet, Milton, Pewamo

Taxonomic classification: Fine, mixed, active, mesic Typic Argiaquolls

Typical Pedon

Millsdale silty clay loam, 0 to 1 percent slopes; about 2 miles southeast of Parkertown, in Groton Township; about 2,125 feet west of the intersection of Strecker Road (County Road 15) and Bemis Road (Township Road 109), along Strecker Road, then 850 feet south; quadrangle 1; T. 5 N., R. 24 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

Btg1—10 to 14 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common faint grayish brown (10YR 5/2) clay films and light brownish gray (10YR 6/2) coatings on faces of peds; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common fine distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.

Btg2—14 to 21 inches; gray (10YR 5/1) silty clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common faint grayish brown (10YR 5/2) clay films and dark grayish brown (10YR 4/2) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.

Btg3—21 to 27 inches; gray (10YR 5/1) silty clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.

BCg—27 to 33 inches; grayish brown (10YR 5/2) silty clay loam; weak coarse subangular blocky structure; firm; few very fine roots; common faint grayish brown (10YR 5/2) coatings on faces of peds; few distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium faint gray (10YR 5/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.

2R—33 to 35 inches; unweathered limestone bedrock.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 18 inches
Thickness of the solum: 20 to 40 inches
Depth to limestone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam
Content of rock fragments—0 to 15 percent

Btg or Bt horizon:
Color—hue of 10YR, 2.5Y, or 5Y or is neutral; value of 3 to 6; chroma generally 0 to 2 but ranges to 4 in the lower part
Texture—silty clay loam, clay loam, silty clay, clay
Content of rock fragments—0 to 15 percent

BC or BCg horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 to 4
Texture—silty clay loam, clay loam
Content of rock fragments—0 to 15 percent

Milton Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate or moderately slow
Parent material: Till and residuum derived from limestone or dolostone
Landform: Lake plains
Position on the landform: Flat areas, rises, backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Bennington, Castalia, Millsdale, Ritchey

Taxonomic classification: Fine, mixed, active, mesic Typic Hapludalfs

Typical Pedon

Milton silt loam, 0 to 2 percent slopes; about 3 miles west of Parkertown, in Groton Township; about 3,250 feet south of the intersection of Portland Road (County Road 32) and Southwest Road (County Road 1), along Southwest Road, then 394 feet east; quadrangle 3; T. 5 N., R. 24 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium and fine granular structure; friable; few fine and very fine roots; 5 percent mixed areas of yellowish brown (10YR 5/4) BE material; 2 percent rock fragments; neutral; abrupt smooth boundary.

BE—8 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; few very fine roots; common faint brown (10YR 5/3) clay depletions on faces of peds; 2 percent rock fragments; strongly acid; clear wavy boundary.

Bt1—10 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common faint yellowish brown (10YR 5/4) clay films and coatings on faces of peds; 2 percent rock fragments; very strongly acid; clear wavy boundary.

2Bt2—15 to 24 inches; dark yellowish brown (10YR 4/4) silty clay; strong medium subangular blocky structure; firm; few very fine roots; many distinct dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; 2 percent limestone fragments; moderately acid; clear wavy boundary.

2Bt3—24 to 28 inches; brown (10YR 4/3) silty clay; moderate medium and coarse subangular blocky structure; firm; few very fine roots; common faint dark brown (10YR 3/3) clay films and brown (10YR 4/3) coatings on faces of peds; 5 percent limestone fragments; slightly alkaline; abrupt wavy boundary.

2R—28 to 30 inches; unweathered limestone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to limestone or dolostone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam
Content of rock fragments—0 to 5 percent

BE horizon:
Color—hue of 10YR or 7.5YR, value of 5 or 6, chroma of 3 or 4
Texture—silt loam, loam
Content of rock fragments—0 to 5 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silty clay loam, clay loam
Content of rock fragments—0 to 5 percent

2Bt horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 3 to 5; chroma of 3 to 6
Texture—clay, silty clay, silty clay loam, clay loam, the channery analogs of those textures
Content of rock fragments—2 to 25 percent

Miner Series

Depth class: Very deep and deep
Drainage class: Very poorly drained
Permeability: Slow
Parent material: Till, mostly derived from shale; till, mostly derived from shale, overlying shale in the bedrock substratum phase
Landform: Ground moraines and lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Bennington, Condit, Hornell

Taxonomic classification: Fine, illitic, mesic Mollic Epiaqualfs

Typical Pedon

Miner silty clay loam, 0 to 1 percent slopes; about 3 miles south of Vermilion, in Vermilion Township; about 4,065 feet east of the intersection of Mason Road (County Road 13) and State Route 60 along Mason Road, then 197 feet south; quadrangle 1; T. 6 N., R. 20 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; few fine and very fine roots; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

Btg1—9 to 15 inches; dark gray (10YR 4/1) clay loam; moderate medium and coarse subangular blocky structure; firm; few very fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; few faint dark grayish brown (10YR 4/2) organic coats on faces of peds; few faint dark grayish brown (10YR 4/2) krotovinas; common fine prominent strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few fine black (10YR 2/1) iron and manganese concretions in the matrix; 5 percent rock fragments; moderately acid; clear wavy boundary.

Btg2—15 to 20 inches; gray (10YR 5/1) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few faint dark grayish brown (10YR 4/2) krotovinas; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; common medium black (10YR 2/1) iron and manganese concretions in the matrix; 5 percent rock fragments; moderately acid; clear wavy boundary.

Btg3—20 to 34 inches; gray (N 5/) silty clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; common prominent black (10YR 2/1) iron and manganese stains on faces of peds; few medium prominent strong brown (7.5YR 5/6) and many fine distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; slightly acid; gradual wavy boundary.

BC—34 to 53 inches; brown (10YR 4/3) silty clay loam; weak coarse subangular blocky structure; firm; common distinct gray (10YR 5/1) coatings on faces of peds; few medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; many medium distinct gray (N 5/) iron depletions in the matrix; 5 percent rock fragments; neutral; gradual wavy boundary.

Cg—53 to 65 inches; grayish brown (10YR 5/2) clay loam; massive; firm; common coarse distinct gray (N 5/) iron depletions in the matrix; common medium faint brown (10YR 4/3) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; slightly effervescent; slightly alkaline; gradual wavy boundary.

C—65 to 80 inches; brown (10YR 4/3) channery clay loam; massive; firm; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; 15 percent rock fragments; slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the dark epipedon: 7 to 9 inches
Thickness of the solum: 30 to 60 inches
Depth to carbonates: 36 to 60 inches
Depth to bedrock: Dominantly more than 80 inches; 40 to 60 inches to shale in the bedrock substratum phase

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam, silt loam
Content of rock fragments—0 to 2 percent

Btg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—clay loam, silty clay loam, silty clay, clay
Content of rock fragments—0 to 10 percent

BC or BCg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 4
Texture—clay loam, silty clay loam, silty clay
Content of rock fragments—2 to 10 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 or 5; chroma of 0 to 4
Texture—clay loam, silty clay loam, silty clay, the channery analogs of those textures
Content of rock fragments—2 to 20 percent

Mitiwanga Series

Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Till overlying sandstone
Landform: Lake plains and ground moraines
Position on the landform: Flat areas, rises, footslopes, backslopes
Slope: 0 to 6 percent
Adjacent soils: Bennington, Haskins, Wakeman

Taxonomic classification: Fine-loamy, mixed, active, mesic Aeric Endoaqualfs

Typical Pedon

Mitiwanga silt loam, 0 to 2 percent slopes; about 2 miles northwest of Birmingham, in Florence Township; about 3,560 feet south of the intersection of Harrison Road (Township Road 145) and Angling Road (Township Road 144), along Harrison Road, then 750 feet west; quadrangle 2; T. 5 N., R. 20 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine and very fine roots throughout; 2 percent rock fragments; very strongly acid; abrupt wavy boundary.

BE—9 to 11 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common medium and fine roots throughout; dark grayish brown (10YR 4/2) organic coats on faces of peds; common distinct light brownish gray (10YR 6/2) clay depletions on faces of peds; many medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; 2 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm; common medium and fine roots throughout; many distinct gray (10YR 5/1) clay films on faces of peds; common distinct gray (10YR 5/1) clay depletions on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—16 to 25 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots throughout; many distinct gray (10YR 6/1) clay films on faces of peds; common distinct gray (10YR 6/1) clay depletions on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; very strongly acid; abrupt wavy boundary.

2R—25 to 27 inches; unweathered sandstone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to sandstone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam
Content of rock fragments—2 to 15 percent

BE horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, loam
Content of rock fragments—2 to 15 percent

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—loam, clay loam, silty clay loam, the channery analogs of those textures
Content of rock fragments—2 to 30 percent

Nolin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the subsoil
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Flat areas, areas adjacent to stream channels
Slope: 0 to 2 percent
Adjacent soils: Holly, Orrville, Saylesville

Taxonomic classification: Fine-silty, mixed, active, mesic Dystric Fluventic Eutrochrepts

Typical Pedon

Nolin silt loam, 0 to 2 percent slopes, occasionally flooded; about 3 miles northeast of Milan, in Milan Township; about 1,750 feet east of the intersection of Mason Road (County Road 13) and State Route 13, along Mason Road, then 1,300 feet south; quadrangle 2; T. 5 N., R. 22 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; moderate medium and fine granular structure; friable; common fine and very fine roots; many distinct dark brown (10YR 3/3) organic coatings on faces of peds; neutral; clear smooth boundary.

Bw1—10 to 19 inches; brown (10YR 4/3) silt loam; weak coarse subangular blocky structure; friable; few very fine roots; many faint dark brown (10YR 3/3) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bw2—19 to 29 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure parting to moderate medium and fine granular; friable; few very fine roots; many faint dark brown (10YR 3/3) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bw3—29 to 47 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure parting to weak medium and fine granular; friable; few very fine roots; common faint dark brown (10YR 3/3) organic coatings on faces of peds; neutral; gradual wavy boundary.

C1—47 to 60 inches; brown (10YR 4/3) silt loam; massive; friable; few fine distinct gray (10YR 5/1) iron depletions in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral; gradual wavy boundary.

C2—60 to 80 inches; brown (10YR 4/3) silt loam; massive; friable; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common fine prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; neutral.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 or 3
Texture—silt loam
Content of rock fragments—0 to 5 percent

Bw horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, silty clay loam
Content of rock fragments—0 to 5 percent

C or Cg horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, chroma of 2 to 6
Texture—silt loam, loam, fine sandy loam, sandy loam, the gravelly analogs of those textures
Content of rock fragments—0 to 35 percent

Oakville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Rapid
Parent material: Sandy deposits
Landform: Dunes and beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Elnora, Gilford

Taxonomic classification: Mixed, mesic Typic Udipsamments

Typical Pedon

Oakville loamy fine sand, 0 to 6 percent slopes; about 5 miles southeast of Sandusky, in Huron Township; about 3,500 feet south of the intersection of U.S. Route 250 and Bogart Road (County Road 10), along U.S. Route 250, then about 2,250 feet east; T. 6 N., R. 22 W.

Ap—0 to 9 inches; brown (10YR 4/3) loamy fine sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; common very fine and fine roots; mixed areas of brownish yellow (10YR 6/6) Bw material; moderately acid; abrupt wavy boundary.

Bw—9 to 26 inches; brownish yellow (10YR 6/6) loamy fine sand; weak fine granular structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

C1—26 to 40 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grain; loose; few fine roots; common fine distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; moderately acid; gradual wavy boundary.

C2—40 to 60 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; common medium prominent dark reddish brown (5YR 3/4) masses that have accumulated iron and are in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; moderately acid; gradual wavy boundary.

C3—60 to 80 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; single grain; loose; many coarse prominent dark reddish brown (5YR 3/4) masses that have accumulated iron and are in the matrix; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; moderately acid.

Range in Characteristics

Thickness of the solum: 18 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 2 to 4
Texture—loamy fine sand
Content of rock fragments—0 to 3 percent

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 to 8
Texture—fine sand, loamy fine sand
Content of rock fragments—0 to 3 percent

C horizon:
Color—hue of 10YR or 2.5Y, value of 5 or 6, chroma of 2 to 6
Texture—loamy fine sand, fine sand
Content of rock fragments—0 to 3 percent

Ogontz Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Stratified lacustrine deposits
Landform: Lake plains and deltas
Position on the landform: Flat areas, slight rises, knolls, backslopes, shoulders,
Slope: 0 to 6 percent
Adjacent soils: Bixler, Shinrock, Zurich

Taxonomic classification: Fine-silty, mixed, active, mesic Aquic Hapludalfs

Typical Pedon

Ogontz fine sandy loam, 0 to 2 percent slopes; about 2 miles southeast of Huron, in Huron Township; about 1,050 feet northwest of the intersection of Berlin Road (County Road 132) and State Route 2, along Berlin Road, then 1,125 feet west; T. 6 N., R. 22 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak medium and fine granular structure; friable; common fine and very fine roots; neutral; abrupt wavy boundary.

BE—10 to 12 inches; yellowish brown (10YR 5/4) loam; weak medium and fine subangular blocky structure; friable; few very fine roots; common faint light yellowish brown (10YR 6/4) clay depletions on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few fine faint pale brown (10YR 6/3) iron depletions in the matrix; neutral; clear wavy boundary.

Bt1—12 to 17 inches; yellowish brown (10YR 5/4) silt loam; moderate medium and fine angular blocky structure; friable; few very fine roots; many faint brown (10YR 5/3) clay films and coatings on faces of peds; common medium faint dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; few medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral; clear wavy boundary.

Bt2—17 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and coarse angular blocky structure; firm; few very fine roots; common distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; neutral; gradual wavy boundary.

Bt3—24 to 30 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and coarse angular blocky structure; friable; few very fine roots; common distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; many medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; grayish brown (10YR 5/2) iron depletions in the matrix; slightly alkaline; clear wavy boundary.

BC—30 to 36 inches; brown (10YR 4/3) silt loam; weak coarse subangular blocky structure; friable; strata of silty clay loam; few very fine roots; common medium distinct gray (10YR 5/1) iron depletions and yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few distinct light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—36 to 60 inches; brown (10YR 4/3) silt loam; massive; friable; strata of silty clay loam; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium prominent strong brown (7.5YR 5/6) and common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few distinct light gray (10YR 7/1) accumulations of calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—60 to 80 inches; brown (10YR 5/3) silt loam stratified with thin layers of very fine sandy loam; massive; friable; common coarse prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to 48 inches
Depth to carbonates: 24 to 48 inches

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 2 or 3
Texture—fine sandy loam, silt loam

BE horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 3 or 4
Texture—silt loam, loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, silty clay loam

C or Cg horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 6
Texture—silt loam; commonly with strata of silty clay loam, very fine sandy loam, fine sandy loam, loamy fine sand, loamy very fine sand

Olmsted Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate or moderately rapid in the solum
Parent material: Loamy deposits
Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope: 0 to 1 percent
Adjacent soils: Conotton, Miner

Taxonomic classification: Fine-loamy, mixed, active, mesic Mollic Endoaqualfs

Typical Pedon

Olmsted loam, 0 to 1 percent slopes; about 1 mile north of Norton, in Copley Township, Summit County, Ohio; 1,500 feet north of Wright Avenue, 2,000 feet south of State Route 162, and 2,100 feet south of White Pond; T. 2 N., R. 12 W.

Ap—0 to 8 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak medium granular structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.

Eg1—8 to 13 inches; gray (5Y 6/1) loam; weak medium subangular blocky structure; firm; common fine roots; common medium prominent strong brown (7.5YR 5/8) masses that have accumulated iron and are in old root channels; very strongly acid; clear smooth boundary.

Eg2—13 to 21 inches; gray (5Y 5/1) coarse sandy loam; weak medium subangular blocky structure; few fine roots; many fine prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; 5 percent pebbles; very strongly acid; clear smooth boundary.

Btg1—21 to 29 inches; gray (5Y 5/1) coarse sandy loam; weak medium subangular blocky structure; friable; common faint gray (5Y 5/1) clay films coating and bridging sand grains; many medium prominent strong brown (7.5YR 5/8) masses that have accumulated iron and are in the matrix; 5 percent pebbles; very strongly acid; clear smooth boundary.

Btg2—29 to 32 inches; dark gray (10YR 4/1) sandy clay loam; weak medium subangular blocky structure; friable; common faint dark gray (10YR 4/1) clay films bridging and coating sand grains; common medium prominent yellowish red (5YR 4/8) masses that have accumulated iron and are in the matrix; strongly acid; abrupt smooth boundary.

BC—32 to 34 inches; strong brown (7.5YR 5/6) coarse sandy loam; massive; firm; strongly acid; abrupt smooth boundary.

Cg—34 to 41 inches; dark gray (N 4/) gravelly coarse sandy loam; massive; friable; many medium prominent yellowish red (5YR 4/6) masses that have accumulated iron and are in the matrix; 25 percent pebbles; strongly acid; clear smooth boundary.

C—41 to 60 inches; yellowish red (5YR 4/6) and brown (7.5YR 4/2) sandy clay loam; massive; friable; moderately acid.

Range in Characteristics

Thickness of the dark epipedon: 7 to 9 inches
Thickness of the solum: 27 to 55 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—loam
Content of rock fragments—0 to 10 percent

Eg or BEg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 or 5; chroma of 0 to 2
Texture—loam, coarse sandy loam, sandy loam
Content of rock fragments—0 to 10 percent

Btg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 or 5; chroma of 0 to 2
Texture—loam, sandy loam, the gravelly analogs of those textures
Content of rock fragments—0 to 25 percent

BC or BCg horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, chroma of 1 to 6
Texture—loam, sandy loam, the gravelly analogs of those textures
Content of rock fragments—0 to 35 percent

C or Cg horizon:
Color—hue of 10YR to 5Y, value of 4 or 5, chroma of 1 to 4
Texture—loam, sandy loam, loamy sand, sand, the gravelly analogs of those textures
Content of rock fragments—0 to 35 percent

Orrville Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate or moderately rapid
Parent material: Alluvium overlying sandstone
Landform: Flood plains
Position on the landform: Flat areas
Slope: 0 to 2 percent
Adjacent soils: Holly, Saylesville, Zurich

Taxonomic classification: Fine-loamy, mixed, active, nonacid, mesic Aeric Fluvaquents

Typical Pedon

Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, occasionally flooded; about 3 miles southwest of Birmingham, in Florence Township; about 1,150 feet north of the Huron County line along West Road (Township Road 62), then 2,700 feet east; quadrangle 1; T. 5 N., R. 20 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; common fine and medium roots; moderately acid; clear wavy boundary.

Bw—9 to 14 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure; friable; common fine and very fine roots; many distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; common medium faint dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; moderately acid; clear wavy boundary.

Bg1—14 to 24 inches; grayish brown (10YR 5/2) silt loam; moderate fine and medium subangular blocky structure; friable; few fine and very fine roots; common faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; few prominent reddish brown (2.5YR 4/4) iron and manganese stains on faces of peds; common coarse faint brown (10YR 5/3) and common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; moderately acid; clear wavy boundary.

Bg2—24 to 37 inches; grayish brown (10YR 5/2) silt loam; weak medium and coarse subangular blocky structure; friable; few very fine roots; few faint grayish brown (10YR 5/2) coatings on faces of peds; few prominent reddish brown (2.5YR 4/4) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; moderately acid; gradual wavy boundary.

BCg—37 to 41 inches; gray (10YR 5/1) silt loam; weak medium and coarse subangular blocky structure; friable; few fine and very fine roots; many coarse distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; moderately acid; clear wavy boundary.

Cg—41 to 63 inches; gray (10YR 5/1) silt loam; massive; friable; common coarse distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; moderately acid; clear wavy boundary.

C—63 to 69 inches; yellowish brown (10YR 5/6) gravelly loam; massive; friable; many medium prominent brown (7.5YR 4/2) iron depletions in the matrix; 20 percent rock fragments; moderately acid; abrupt smooth boundary.

2R—69 to 71 inches; unweathered sandstone bedrock.

Range in Characteristics

Thickness of the solum: 24 to 50 inches

Depth to sandstone bedrock: 60 to 80 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4, chroma of 2
Texture—silt loam
Content of rock fragments—0 to 5 percent

Bw horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 3 to 6
Texture—loam, silt loam, silty clay loam, clay loam
Content of rock fragments—0 to 15 percent

Bg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—loam, silt loam, silty clay loam, clay loam
Content of rock fragments—0 to 15 percent

C or Cg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 6
Texture—silt loam, loam, sandy loam, loamy sand, gravelly loam, gravelly sandy loam
Content of rock fragments—0 to 25 percent

Oshtemo Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the solum and very rapid in the substratum
Parent material: Loamy and sandy deposits
Landform: Ground moraines and on beach ridges on lake plains
Position on the landform: Backslopes, shoulders, summits
Slope: 0 to 6 percent slopes
Adjacent soils: Elnora, Jimtown, Millgrove, Rawson

Taxonomic classification: Coarse-loamy, mixed, active, mesic Typic Hapludalfs

Typical Pedon

Oshtemo loamy sand, 0 to 6 percent slopes; about 2 miles southeast of Berlin Heights, in Berlin Township; about 1,850 feet north of the intersection of State Route 113 and Andress Road (Township Road 136), along Andress Road, then 385 feet east; quadrangle 1; T. 5 N., R. 21 W.

Ap—0 to 10 inches; brown (10YR 4/3) loamy sand, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; very friable; 10 percent pebbles; slightly acid; abrupt smooth boundary.

E—10 to 14 inches; yellowish brown (10YR 5/4) loamy sand; weak fine and medium granular structure; very friable; few very fine roots; few distinct brown (10YR 4/3) organic coatings on faces of peds; 5 percent pebbles; strongly acid; clear wavy boundary.

Bt1—14 to 20 inches; brown (7.5YR 4/4) gravelly sandy clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds and on pebbles; 25 percent pebbles; strongly acid; clear wavy boundary.

Bt2—20 to 28 inches; dark yellowish brown (10YR 4/4) gravelly coarse sandy loam; moderate medium and coarse subangular blocky structure; friable; few very fine roots; common faint brown (10YR 4/3) clay films on faces of peds and on pebbles; 30 percent pebbles; moderately acid; gradual wavy boundary.

Bt3—28 to 41 inches; brown (10YR 4/3) gravelly coarse sandy loam; weak medium and coarse subangular blocky structure; friable; few very fine roots; common faint brown (10YR 4/3) clay films on faces of peds and on pebbles; 30 percent pebbles; neutral; clear wavy boundary.

C1—41 to 70 inches; dark grayish brown (10YR 4/2) very gravelly coarse sand; single grain; loose; 50 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—70 to 80 inches; brown (10YR 4/3) sand; single grain; loose; 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 75 inches
Depth to carbonates: 40 to 70 inches

Ap horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, chroma of 2 or 3
Texture—loamy sand
Content of rock fragments—1 to 15 percent

E horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 3 to 6
Texture—sandy loam, fine sandy loam, loamy sand, loamy fine sand, the gravelly analogs of those textures
Content of rock fragments—1 to 30 percent

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, chroma of 3 to 6
Texture—coarse sandy loam, sandy loam, sandy clay loam, the gravelly analogs of those textures
Content of rock fragments—1 to 30 percent

C horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 6
Texture—sand, coarse sand, the gravelly and very gravelly analogs of those textures
Content of rock fragments—10 to 50 percent

Pewamo Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow
Parent material: Till or lacustrine deposits and till
Landform: Lake plains and ground moraines
Position on the landform: Extensive flat areas, drainageways, depressions
Slope: 0 to 1 percent
Adjacent soils: Bennington, Fries, Hornell

Taxonomic classification: Fine, mixed, active, mesic Typic Argiaquolls

Typical Pedon

Pewamo silty clay loam, 0 to 1 percent slopes; about 1 mile south of Parkertown, in Groton Township; about 950 feet south of the intersection of Billings Road (Township Road 38) and Strecker Road (County Road 15), along Billings Road, then 131 feet west; quadrangle 1; T. 5 N., R. 24 W.

Ap—0 to 12 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bg1—12 to 16 inches; dark gray (10YR 4/1) silty clay loam; moderate fine and medium subangular blocky structure; firm; few very fine roots; many faint dark gray (10YR 4/1) coatings on faces of peds; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few faint black (10YR 2/1) krotovinas; 2 percent rock fragments; neutral; clear wavy boundary.

Bg2—16 to 23 inches; gray (10YR 5/1) clay; moderate medium subangular blocky structure; firm; few very fine roots; common faint gray (10YR 5/1) coatings on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; common medium and fine prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few faint black (10YR 2/1) krotovinas; 1 percent rock fragments; neutral; clear wavy boundary.

Bg3—23 to 33 inches; gray (10YR 5/1) clay loam; weak coarse subangular blocky structure; firm; few very fine roots; few faint gray (10YR 5/1) coatings on faces of peds; many medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few faint black (10YR 2/1) krotovinas; 1 percent rock fragments; neutral; clear wavy boundary.

BCg—33 to 48 inches; gray (10YR 5/1) silty clay loam; weak coarse subangular blocky structure; firm; few very fine roots; few faint grayish brown (10YR 5/2) coatings on vertical faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few medium distinct brown (7.5YR 4/2) iron depletions in the matrix; few light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg1—48 to 72 inches; gray (10YR 5/1) silty clay loam; massive; firm; few very fine and fine roots; few faint grayish brown (10YR 5/2) coatings on vertical faces of peds; common medium distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; common medium distinct brown (7.5YR 4/2) iron depletions in the matrix; few light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cg2—72 to 80 inches; grayish brown (10YR 5/2) silty clay loam; massive; firm; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; few light gray (10YR 7/1) masses that have accumulated calcium carbonate and are in the matrix; 2 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 17 inches
Thickness of the solum: 40 to 70 inches
Depth to carbonates: 28 to 60 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silty clay loam
Content of rock fragments—0 to 10 percent

Bg or Bw horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 to 4
Texture—silty clay, clay, clay loam, silty clay loam
Content of rock fragments—0 to 10 percent

BCg or BC horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 to 4
Texture—silty clay loam, clay loam
Content of rock fragments—1 to 15 percent

Cg or C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 to 4
Texture—silty clay loam, clay loam
Content of rock fragments—1 to 15 percent

The Pewamo soils in Erie County do not have the argillic horizon that is definitive for the series. They classify as fine, mixed, active, mesic Typic Endoaquolls. This difference, however, does not significantly affect the use and management of the soils.

Plumbrook Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid in the loamy and sandy material and moderately slow in the finer textured material
Parent material: Loamy and sandy deposits overlying finer textured lacustrine deposits
Landform: Lake plains and deltas
Position on the landform: Flat areas, slight depressions
Slope: 0 to 2 percent
Adjacent soils: Colwood, Elnora, Gilford, Tuscola

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aquic Hapludolls

Typical Pedon

Plumbrook fine sandy loam, 0 to 2 percent slopes; about 2 miles northeast of Avery, in Huron Township; 1,200 feet north of the intersection of U.S. Route 250 and Shied Road (Township Road 12), along U.S. Route 250, then 485 feet west; quadrangle 4; T. 6 N., R. 22 W.

Ap—0 to 11 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine and medium granular structure; friable; few fine and very fine roots; strongly acid; clear wavy boundary.

Bg—11 to 19 inches; dark grayish brown (10YR 4/2) very fine sandy loam; weak coarse subangular blocky structure; friable; few fine and very fine roots; common distinct black (10YR 2/1) organic coatings and common faint dark gray (10YR 4/1) clay depletions on faces of peds; few medium distinct olive brown (2.5Y 4/4) masses that have accumulated iron and are in the matrix; few fine faint black (10YR 2/1) iron and manganese concretions in the matrix; slightly acid; clear wavy boundary.

Bw—19 to 29 inches; brownish yellow (10YR 6/6) fine sandy loam; weak coarse subangular blocky structure; friable; few fine and very fine roots; common distinct brown (10YR 5/3) clay depletions on faces of peds; many medium distinct light brownish gray (10YR 6/2) and common medium distinct brown (10YR 5/3) iron depletions in the matrix; few fine prominent black (10YR 2/1) iron and manganese concretions in the matrix; neutral; gradual wavy boundary.

Cg1—29 to 40 inches; grayish brown (10YR 5/2) loamy fine sand; single grain; loose; many coarse distinct brownish yellow (10YR 6/6) masses that have accumulated iron and are in the matrix; neutral; gradual wavy boundary.

Cg2—40 to 65 inches; dark grayish brown (10YR 4/2) fine sand; single grain; loose; common coarse distinct yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; few coarse faint gray (10YR 6/1) iron depletions in the matrix; slightly effervescent; slightly alkaline; clear wavy boundary.

2Cg3—65 to 80 inches; gray (N 5/) silty clay loam; massive; firm; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 14 inches
Thickness of the solum: 25 to 45 inches
Depth to carbonates: 20 to 48 inches
Depth to the 2Cg horizon: 60 to 80 inches

Ap horizon:
Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—fine sandy loam
Content of rock fragments—0 to 2 percent

Bg or Bw horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 1 to 4
Texture—fine sandy loam; very fine sandy loam; loam; thin subhorizons of sandy loam, silty clay loam, loamy fine sand

Cg or C horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 4 to 6; chroma of 0 to 4
Texture—loamy fine sand; fine sand; thin subhorizons of sand, loamy sand, fine sandy loam, sandy loam

2Cg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 or 5; chroma of 0 to 2
Texture—silty clay loam

Randolph Series

Depth class: Moderately deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Parent material: Till overlying limestone or dolostone
Landform: Lake plains
Position on the landform: Flat areas, slight rises
Slope: 0 to 2 percent slopes
Adjacent soils: Bennington, Milton, Pewamo

Taxonomic classification: Fine, mixed, active, mesic Aeric Endoaqualfs

Typical Pedon

Randolph silt loam, 0 to 2 percent slopes; about 2 miles south of Castalia, in Margaretta Township; about 2,900 feet east and 1,700 feet south of the intersection of Parker Road (Township Road 27) and Deyo Toad (Township Road 102); quadrangle 4; T. 6 N., R. 24 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium and fine granular structure; friable; common fine and very fine roots; 3 percent rock fragments; moderately acid; abrupt smooth boundary.

Bt—10 to 16 inches; yellowish brown (10YR 5/4) silty clay; moderate medium and coarse subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; slightly acid; clear wavy boundary.

Btg—16 to 23 inches; grayish brown (10YR 5/2) silty clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; common faint dark grayish brown (10YR 4/2) clay films and coatings on faces of peds; common medium faint brown (10YR 4/3) masses that have accumulated iron and are in the matrix; common medium faint gray (10YR 5/1) iron depletions in the matrix; 5 percent rock fragments; neutral; clear wavy boundary.

BCg1—23 to 29 inches; gray (10YR 5/1) clay loam; weak medium and coarse subangular blocky structure; firm; few very fine roots; common faint gray (10YR 5/1) coatings on faces of peds; few distinct light gray (10YR 7/1) calcium carbonate coatings on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and few medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 10 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

BCg2—29 to 37 inches; gray (10YR 5/1) clay loam; weak coarse subangular blocky structure; firm; few very fine roots; few distinct light gray (10YR 7/1) calcium carbonate coatings on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and few medium prominent yellowish brown (10YR 5/6) masses in which iron has accumulated; 10 percent rock fragments, of which most are limestone; strongly effervescent; moderately alkaline; abrupt smooth boundary.

2R—37 to 39 inches; unweathered limestone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to limestone or dolostone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 3
Texture—silt loam
Content of rock fragments—0 to 3 percent

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—clay loam, silty clay loam, silty clay, clay
Content of rock fragments—0 to 3 percent in the upper part and 2 to 15 percent in the lower part

BC or BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—clay loam, silty clay loam
Content of rock fragments—2 to 15 percent

Rawson Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the loamy material and slow or very slow in the till or lacustrine deposits
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Landform: Ground moraines and lake plains
Position on the landform: Flat areas, knolls, rises, backslopes, shoulders, summits
Slope: 0 to 6 percent
Adjacent soils: Bennington, Cardington, Haskins

Taxonomic classification: Fine-loamy, mixed, active, mesic Oxyaquic Hapludalfs

Typical Pedon

Rawson sandy loam, 2 to 6 percent slopes; about 3 miles northeast of Bellevue, in Groton Township; about 1,460 feet east of the intersection of Potter Road (Township Road 98) and State Route 269, along Potter Road, then 265 feet south; quadrangle 4; T. 5 N., R. 24 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine and very fine roots; 4 percent rock fragments; strongly acid; abrupt smooth boundary.

BE—10 to 12 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; common fine and very fine roots; common faint yellowish brown (10YR 5/4) coatings and few distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; 4 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—12 to 22 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; few fine and very fine roots; many faint dark yellowish brown (10YR 4/4) clay films and few faint yellowish brown (10YR 5/4) coatings on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; common fine distinct black (10YR 2/1) iron and manganese concretions in the matrix;

5 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—22 to 30 inches; dark yellowish brown (10YR 4/4) loam; moderate medium and coarse subangular blocky structure; friable; few very fine roots; common faint brown (10YR 4/3) clay films and common distinct brown (10YR 5/3) coatings on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; 5 percent rock fragments; strongly acid; clear wavy boundary.

2Bt3—30 to 39 inches; brown (10YR 4/3) clay loam; moderate coarse subangular blocky structure; firm; few very fine roots; common distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; common distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium and fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; 3 percent rock fragments; strongly acid; gradual wavy boundary.

2BC—39 to 51 inches; brown (10YR 4/3) clay loam; weak coarse platy structure; firm; few distinct black (10YR 2/1) iron and manganese stains on faces of plates; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; 4 percent rock fragments; neutral; gradual wavy boundary.

2C—51 to 80 inches; brown (10YR 4/3) silty clay loam; massive; firm; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; 4 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 51 inches
Depth to carbonates: 30 to 51 inches
Depth to the 2B horizon: 20 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—sandy loam
Content of rock fragments—0 to 15 percent

BE horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—loam, sandy loam
Content of rock fragments—0 to 15 percent

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—loam, sandy clay loam, clay loam, the gravelly analogs of those textures
Content of rock fragments—2 to 30 percent

2Bt, 2Btg, 2BCg, and 2BC horizons:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 6
Texture—clay, silty clay, clay loam, silty clay loam
Content of rock fragments—0 to 10 percent

2C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silty clay loam, clay loam
Content of rock fragments—0 to 10 percent

Rimer Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid in the sandy material and slow or very slow in the underlying till
Parent material: Sandy deposits and the underlying till
Landform: Lake plains and ground moraines
Position on the landform: Flat areas, slight rises, summits
Slope: 0 to 2 percent
Adjacent soils: Bennington, Haskins, Mermill

Taxonomic classification: Loamy, mixed, active, mesic Aquic Arenic Hapludalfs

Typical Pedon

Rimer loamy fine sand, 0 to 2 percent slopes; about 1 mile southeast of Berlinville, in Berlin Township; about 2,300 feet east of the intersection of Tennant Road (Township Road 88) and Collins Road (Township Road 57), along Tennant Road, then 1,400 feet south; quadrangle 4; T. 5 N., R. 21 W.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) loamy fine sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; common very fine roots; mixed areas of brown (10YR 5/3) E1 material; strongly acid; abrupt smooth boundary.

E1—11 to 15 inches; brown (10YR 5/3) loamy fine sand; weak medium subangular blocky structure; very friable; few very fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; common prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; slightly acid; clear wavy boundary.

E2—15 to 25 inches; brown (10YR 5/3) loamy fine sand; weak coarse subangular blocky structure; very friable; few very fine roots; common prominent yellowish red (5YR 5/6) iron and manganese stains on faces of peds; common coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; few coarse distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; slightly acid; clear wavy boundary.

Btg—25 to 30 inches; light brownish gray (10YR 6/2) fine sandy loam; weak coarse subangular blocky structure; very friable; few very fine roots; brown (7.5YR 4/4) clay bridging between sand grains; common faint grayish brown (10YR 5/2) clay films on faces of peds; common prominent yellowish red (5YR 5/6) and common distinct black (10YR 2/1) iron and manganese stains on faces of peds; common coarse prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; neutral; abrupt wavy boundary.

2Bt—30 to 39 inches; brown (10YR 4/3) silty clay loam; moderate medium and coarse subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.

2BC—39 to 45 inches; brown (10YR 4/3) clay loam; weak coarse subangular blocky structure; firm; many distinct grayish brown (10YR 5/2) coatings and few distinct light gray (10YR 7/2) calcium carbonate coatings on faces of peds; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common fine distinct black (10YR 2/1) iron and manganese concretions; 3 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C—45 to 80 inches; brown (10YR 4/3) clay loam; massive; firm; few distinct light gray (10YR 7/2) calcium carbonate coatings on faces of partings; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Combined thickness of the A and E horizons: 20 to 32 inches
Thickness of the solum: 25 to 55 inches
Depth to carbonates: 25 to 45 inches
Depth to the 2B horizon: 25 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 3 to 5, chroma of 2 or 3
Texture—loamy fine sand
Content of rock fragments—0 to 3 percent

E or Eg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 4
Texture—loamy fine sand, loamy sand, fine sand
Content of rock fragments—0 to 3 percent

Bt or Btg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 6
Texture—fine sandy loam, sandy loam
Content of rock fragments—0 to 3 percent

2Bt or 2Btg horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 to 4
Texture—clay loam, silty clay loam, silty clay, clay
Content of rock fragments—1 to 8 percent

2C or 2Cg horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 to 4
Texture—clay loam, silty clay loam
Content of rock fragments—1 to 8 percent

Ritchey Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Parent material: Till overlying limestone
Landform: Reefs on lake plains
Position on the landform: Flat areas, knolls, backslopes, shoulders, summits
Slope: 0 to 12 percent
Adjacent soils: Castalia, Milton

Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Hapludalfs

Typical Pedon

Ritchey loam, 2 to 6 percent slopes; about 3 miles southwest of Parkertown, in Groton Township; about 4,725 feet south of the intersection of Southwest Road (County Road 1) and Strecker Road (County Road 15), along Southwest Road, then 700 feet east; quadrangle 4; T. 5 N., R. 24 W.

Ap—0 to 8 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium and fine granular structure; friable; common fine and very fine roots; 1 percent rock fragments; slightly acid; abrupt smooth boundary.

Bt—8 to 14 inches; reddish brown (5YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few very fine roots; common faint reddish brown (5YR 4/4) clay films on faces of peds; common distinct brown (10YR 4/3) organic coatings on faces of peds; 5 percent rock fragments; neutral; abrupt smooth boundary.

2R—14 to 16 inches; unweathered limestone bedrock.

Range in Characteristics

Thickness of the solum: 10 to 20 inches
Depth to limestone bedrock: 10 to 20 inches

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 2 or 3
Texture—loam
Content of rock fragments—1 to 10 percent

Bt horizon:
Color—hue of 10YR, 7.5YR, or 5YR; value of 4 to 6; chroma of 3 to 5
Texture—clay loam; loam; silty clay loam; silt loam; thin subhorizons of silty clay or clay directly above the bedrock in some pedons
Content of rock fragments—1 to 10 percent

Sandusky Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately rapid in the material weathered from tufa and slow or moderately slow in the lacustrine material
Parent material: Calcareous tufa overlying lacustrine deposits
Landform: Lake plains
Position on the landform: Flat areas near spring orifices
Slope: 0 to 1 percent
Adjacent soils: Toledo, Weyers

Taxonomic classification: Fine-loamy, carbonatic, mesic Fluvaquentic Endoaquolls

Typical Pedon

Sandusky loam, 0 to 1 percent slopes; about 2 miles north of Castalia, in Margaretta Township; about 2,600 feet south of the intersection of U.S. Route 6 and State Route 269 (north toward Bay View), then about 220 feet east; quadrangle 3; T. 6 N., R. 24 W.

Ap—0 to 11 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common fine and very fine roots; 5 percent tufa fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

Cg—11 to 22 inches; light brownish gray (2.5Y 6/2) very gravelly coarse sandy loam; moderate medium granular structure; friable; common fine and very fine roots; thin discontinuous layer of very dark grayish brown (10YR 3/2) organic matter; 45 percent tufa fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C—22 to 27 inches; pale brown (10YR 6/3) coarse sandy loam; moderate medium and fine granular structure; friable; common medium faint light gray (10YR 7/2) iron depletions in the matrix; few shell fragments; 3 percent tufa fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

2Cg1—27 to 29 inches; light brownish gray (10YR 6/2) silt loam; weak medium subangular blocky structure; firm; common medium faint pale brown (10YR 6/3) masses that have accumulated iron and are in the matrix; few shell fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

2Cg2—29 to 64 inches; gray (5Y 5/1) silty clay loam; massive; firm; strata of silty clay; many medium prominent light olive brown (2.5Y 5/6) masses that have accumulated iron and are in the matrix; few medium prominent yellowish red (5YR 4/6) iron concretions in the matrix; strongly effervescent; moderately alkaline; clear wavy boundary.

2C—64 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; massive; firm; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium prominent light olive brown (2.5Y 5/6) masses that have accumulated iron and are in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 15 inches
Depth to the 2C or 2Cg horizon: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 2 or 3; chroma of 0 to 2
Texture—loam
Content of tufa fragments—0 to 15 percent

Cg or C horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 8; chroma of 1 to 3
Texture—loam, fine sandy loam, sandy loam, coarse sandy loam, the gravelly or very gravelly analogs of those textures
Content of tufa fragments—0 to 50 percent but averages less than 35 percent

2C or 2Cg horizon:
Color—hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; chroma of 1 to 4
Texture—silty clay loam; strata of silt loam, silty clay

Saylesville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Parent material: Lacustrine deposits
Landform: Dissected areas on lake plains
Position on the landform: Backslopes
Slope: 25 to 40 percent
Adjacent soils: Shinrock, Holly, Nolin

Taxonomic classification: Fine, illitic, mesic Typic Hapludalfs

Typical Pedon

Saylesville silt loam, 25 to 40 percent slopes; about 4 miles northeast of Milan, in Milan Township; about 1,200 feet northeast of the intersection of Mason Road (County Road 13) and River Road (County Road 126), along River Road, then 450 feet east; quadrangle 2; T. 5 N., R. 22 W.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; very dark gray (10YR 3/1) unrubbed; moderate medium and fine granular structure; friable; many coarse and medium roots; neutral; abrupt wavy boundary.

E—6 to 9 inches; pale brown (10YR 6/3) silt loam; weak fine subangular blocky structure; friable; common coarse and medium roots; strongly acid; clear wavy boundary.

BE—9 to 15 inches; brown (10YR 5/3) silty clay loam; weak medium and fine subangular blocky structure; friable; common coarse and medium roots; common distinct pale brown (10YR 6/3) coatings on faces of peds; strongly acid; clear wavy boundary.

Bt1—15 to 24 inches; dark yellowish brown (10YR 4/4) silty clay; strong medium angular blocky structure; firm; few medium and fine roots; many faint dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; moderately acid; clear wavy boundary.

Bt2—24 to 36 inches; dark yellowish brown (10YR 4/4) silty clay; strong coarse angular blocky structure; firm; few medium and fine roots; many faint dark yellowish brown (10YR 4/4) clay films and coatings on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

BC—36 to 40 inches; brown (10YR 4/3) silty clay loam; weak coarse subangular blocky structure; firm; few medium and fine roots; common faint dark yellowish brown (10YR 4/4) clay films and common faint brown (10YR 4/3) coatings on faces of peds; few distinct light gray (10YR 7/2) calcium carbonate coatings on vertical faces; common medium faint brown (10YR 5/3) and few medium distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; slightly effervescent; slightly alkaline; gradual wavy boundary.

C1—40 to 72 inches; brown (10YR 4/3) silty clay loam; massive; friable; strata of silt loam; few distinct light gray (10YR 7/2) calcium carbonate coatings on vertical partings; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—72 to 80 inches; brown (10YR 5/3) silt loam; massive; friable; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Ap or A horizon:
Color—hue of 10YR, value of 3 to 5, chroma of 1 to 3
Texture—silt loam

E horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 or 3
Texture—silt loam, loam, silty clay loam

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 3 or 4
Texture—silty clay loam, silty clay, clay

BC horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4
Texture—silty clay loam

C horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 3 or 4
Texture—silty clay loam; silt loam; thin layers of fine sandy loam or fine sand in some pedons

Shinrock Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow in the solum
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Knolls, backslopes, shoulders, summits
Slope: 2 to 18 percent
Adjacent soils: Del Rey, Milford, Saylesville

Taxonomic classification: Fine, illitic, mesic Aquic Hapludalfs

Typical Pedon

Shinrock silt loam, 2 to 6 percent slopes; about 3 miles north of Milan, in Milan Township; about 2,200 feet south of the intersection of State Route 13 and Mason Road (County Road 13), along State Route 13, then 750 feet east; quadrangle 2; T. 5 N., R. 22 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

BE—9 to 14 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few very fine roots; few faint yellowish brown (10YR 5/4) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; slightly acid; clear wavy boundary.

Bt1—14 to 19 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium and fine subangular blocky structure; firm; few very fine roots; many distinct yellowish brown (10YR 5/4) clay films and coatings on faces of peds; few distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

Bt2—19 to 31 inches; dark yellowish brown (10YR 4/4) silty clay; moderate medium and coarse angular blocky structure; firm; few very fine roots; many distinct brown (10YR 5/3) clay films and coatings on faces of peds; few fine distinct black (10YR 2/1) iron and manganese stains on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; few medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; neutral; gradual wavy boundary.

Bt3—31 to 39 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse angular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films and coatings on faces of peds; few fine distinct black (10YR 2/1) iron and manganese stains on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

BC—39 to 44 inches; brown (10YR 4/3) silty clay loam; weak coarse subangular blocky structure; friable; strata of yellowish brown (10YR 5/8) fine sandy loam; few distinct grayish brown (10YR 5/2) coatings on faces of peds; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; neutral; gradual wavy boundary.

C—44 to 80 inches; brown (10YR 4/3) silt loam stratified with gray (10YR 5/1) silty clay loam and yellowish brown (10YR 5/8) fine sandy loam; massive; friable; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 45 inches
Depth to carbonates: 20 to 45 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silt loam, silty clay loam

BE horizon:
Color—hue of 10YR, value of 5, chroma of 3 or 4
Texture—silt loam, silty clay loam

Bt horizon:
Color—hue of 10YR, 7.5YR, or 2.5Y; value of 4 or 5; chroma of 3 to 6
Texture—silty clay loam, silty clay

BC horizon:
Color—hue of 10YR, 7.5YR, or 2.5Y; value of 4 or 5; chroma of 3 to 6
Texture—silty clay loam; strata of fine sandy loam, silt loam, loam

C or Cg horizon:
Color—hue of 10YR, 7.5YR, or 2.5Y; value of 4 or 5; chroma of 2 to 4
Texture—silt loam; silty clay loam; thin strata of silty clay, silt, fine sandy loam, very fine sand

Spinks Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid or rapid
Parent material: Eolian or beach deposits
Landform: Dunes and beach ridges on lake plains
Position on the landform: Knolls, backslopes, shoulders, summits
Slope: 0 to 18 percent
Adjacent soils: Dunbridge, Elnora, Gilford, Ritchey

Taxonomic classification: Sandy, mixed, mesic Lamellic Hapludalfs (fig. 15)

Figure 15.—Profile of Spinks loamy fine sand, 0 to 6 percent slopes. Note the thin lamellae.

Typical Pedon

Spinks loamy fine sand, 0 to 6 percent slopes; about 3 miles east of Milan, in Milan Township; about 1,300 feet north of the Huron County line, along Milliman Road (Township Road 55), then 250 feet west; quadrangle 1; T. 5 N., R. 22 W.

Ap—0 to 10 inches; brown (10YR 4/3) loamy fine sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; few fine and very fine roots; mixed areas of yellowish brown (10YR

5/6) E material; slightly acid; abrupt smooth boundary.

Bw—10 to 15 inches; yellowish brown (10YR 5/6) fine sand; weak fine granular structure; very friable; few fine and very fine roots; moderately acid; clear wavy boundary.

E and Bt1—15 to 37 inches; yellowish brown (10YR 5/4), loose loamy fine sand (E part); single grain; few fine and medium roots; lamellae of dark yellowish brown (10YR 4/4), very friable loamy fine sand with weak fine subangular blocky structure (Bt part); lamellae, 1/2 inch to 2 inches thick, total 6 inches; slightly acid; clear wavy boundary.

E and Bt2—37 to 52 inches; brown (10YR 5/3), loose loamy fine sand (E part); single grain; few fine roots; lamellae of brown (7.5YR 4/4), very friable loamy fine sand with weak fine subangular blocky structure (Bt part); lamellae, 1 to 4 inches thick, total 6 inches; neutral; clear wavy boundary.

E and Bt3—52 to 72 inches; brown (10YR 5/3), loose loamy fine sand (E part); single grain; few fine roots; lamellae of brown (7.5YR 4/4), very friable loamy fine sand with weak fine subangular blocky structure (Bt part); lamellae, 1/2 inch to 2 inches thick, total 3 inches; neutral; gradual wavy boundary.

C—72 to 80 inches; yellowish brown (10YR 5/4) fine sand; single grain; loose; neutral.

Range in Characteristics

Thickness of the solum: 36 to more than 80 inches
Depth to the first lamella: 15 to 40 inches
Thickness of the lamellae: 1/8 inch to 5 inches with a cumulative total of more than 6 inches

Ap horizon:
Color—hue of 10YR, value of 3 to 5, chroma of 2 to 4
Texture—loamy fine sand
Content of rock fragments—0 to 5 percent

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 7, chroma of 2 to 8
Texture—fine sand, loamy fine sand, loamy sand, sand
Content of rock fragments—0 to 5 percent

E horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 3 to 6
Texture—fine sand, loamy fine sand, loamy sand, sand
Content of rock fragments—0 to 5 percent

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 4 to 6
Texture—loamy fine sand; loamy sand; sand; a few thin lamellae of sandy loam, fine sandy loam
Content of rock fragments—0 to 5 percent

C horizon:
Color—hue of 10YR or 7.5YR, value of 5 or 6, chroma of 3 or 4
Texture—fine sand, sand
Content of rock fragments—0 to 15 percent

Tioga Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate to rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Flat areas
Slope: 0 to 2 percent
Adjacent soils: Holly, Orrville, Saylesville

Taxonomic classification: Coarse-loamy, mixed, semiactive, mesic Dystric Fluventic Eutrochrepts

Typical Pedon

Tioga loam, 0 to 2 percent slopes, occasionally flooded; about 2 miles west of Milan, in Milan Township; about 1,700 feet east of Lovers Lane at the Huron County line, along the county line, then 800 feet north; quadrangle 4; T. 5 N., R. 22 W.

A—0 to 5 inches; dark brown (10YR 3/3) loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; common medium and coarse roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear wavy boundary.

Bw1—5 to 13 inches; brown (10YR 4/3) loam; moderate medium granular structure; friable; common medium and coarse roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bw2—13 to 26 inches; brown (10YR 4/3) loam; weak coarse subangular blocky structure; friable; common medium and coarse roots; neutral; gradual wavy boundary.

C1—26 to 48 inches; brown (10YR 4/3) sandy loam; massive; friable; common fine and medium roots; strata of fine sandy loam and loamy sand; neutral; gradual wavy boundary.

C2—48 to 72 inches; brown (10YR 4/3) sandy loam; massive; friable; neutral; gradual wavy boundary.
Cg—72 to 80 inches; gray (10YR 5/1) sandy loam; massive; friable; common medium prominent brown (7.5YR 4/4) masses that have accumulated iron and are in the matrix; common medium distinct dark grayish brown (10YR 4/2) iron depletions in the matrix; neutral.

Range in Characteristics

Thickness of the solum: 18 to 40 inches

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, chroma of 2 to 4
Texture—loam
Content of rock fragments—0 to 15 percent

Bw horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, chroma of 2 to 4
Texture—loam, fine sandy loam, sandy loam, silt loam, the channery analogs of those textures
Content of rock fragments—0 to 25 percent

C or Cg horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—sandy loam, loam, silt loam, loamy sand, fine sandy loam, the channery or very channery analogs of those textures
Content of rock fragments—0 to 60 percent

Toledo Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Extensive flat areas, depressions
Slope: 0 to 1 percent
Adjacent soils: Fulton, Sandusky

Taxonomic classification: Fine, illitic, nonacid, mesic Mollic Endoaquepts

Typical Pedon

Toledo silty clay, 0 to 1 percent slopes; about 0.5 mile east of Springbrook, in Margaretta Township; about 200 feet west and 350 feet north of the southeast corner of sec. 34, T. 6 N., R. 17 E.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate very fine subangular blocky structure; firm; moderately acid; abrupt smooth boundary.
Bg1—9 to 18 inches; dark gray (10YR 4/1) silty clay; strong medium and fine angular blocky structure; firm; few fine pores in faces of peds; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; neutral; clear smooth boundary.
Bg2—18 to 25 inches; dark gray (5Y 4/1) clay; strong medium and coarse angular blocky structure; very firm; common fine pores in faces of peds; common medium prominent dark yellowish brown (10YR 4/4) and olive brown (2.5Y 4/4) masses that have accumulated iron and are in the matrix; neutral; gradual smooth boundary.
Bg3—25 to 45 inches; gray (5Y 5/1) silty clay; weak coarse prismatic structure parting to strong medium and coarse angular blocky; very firm; many medium prominent light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/4) masses that have accumulated iron and are in the matrix; neutral; gradual wavy boundary.
Cg—45 to 80 inches; light brownish gray (2.5Y 6/2) silty clay; massive; firm; strata of silty clay loam; many coarse distinct gray (10YR 5/1) iron depletions in the matrix; many coarse prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the dark epipedon: 7 to 9 inches
Thickness of the solum: 30 to 60 inches
Depth to carbonates: 30 to 50 inches

Ap horizon:
Color—hue of 10YR or 2.5Y or is neutral; value of 2 or 3; chroma of 0 to 2
Texture—silty clay, silty clay loam

Bg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 2
Texture—silty clay, clay

C or Cg horizon:
Color—hue of 10YR to 5Y or is neutral; value of 4 to 6; chroma of 0 to 6
Texture—silty clay, clay, silty clay loam

Tuscola Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Rapid in the subsurface layer and moderate in the solum and substratum

Parent material: Stratified lacustrine deposits
Landform: Lake plains and deltas
Position on the landform: Flat areas, rises, knolls, backslopes, shoulders
Slope: 0 to 6 percent
Adjacent soils: Bixler, Colwood, Kibbie, Zurich

Taxonomic classification: Fine-loamy, mixed, active, mesic Aquic Hapludalfs

Typical Pedon

Tuscola fine sandy loam, 0 to 2 percent slopes; about 1 mile southwest of Huron, in Huron Township; about 4,850 feet east and 150 feet south of the intersection of Rye Beach Road (Township Road 122) and Bogart Road (County Road 10); quadrangle 2; T. 6 N., R. 22 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; many fine and very fine roots; few fine faint black (10YR 2/1) iron and manganese concretions in the matrix; neutral; abrupt smooth boundary.

E—9 to 15 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; common fine and very fine roots; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; slightly acid; clear wavy boundary.

Bt1—15 to 22 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few very fine roots; common distinct light brownish gray (10YR 6/2) clay films and coatings on faces of peds; few distinct very dark gray (10YR 3/1) and few very fine prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; common medium distinct pale brown (10YR 6/3) iron depletions in the matrix; moderately acid; clear wavy boundary.

Bt2—22 to 28 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; few very fine roots; common distinct light brownish gray (10YR 6/2) clay films and coatings on faces of peds; few distinct very dark gray (10YR 3/1) and few prominent yellowish red (5YR 4/6) iron and manganese stains on faces of peds; many medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common medium distinct dark yellowish brown (10YR 4/6) masses that have accumulated iron and are in the matrix; slightly acid; clear wavy boundary.

Bt3—28 to 35 inches; brown (10YR 4/3) loam; moderate medium and coarse subangular blocky structure; friable; few very fine roots; 1-inch strata of silty clay loam; many distinct light brownish gray (10YR 6/2) clay films and coatings on faces of peds; few distinct very dark gray (10YR 3/1) iron and manganese stains on faces of peds; many medium faint brownish gray (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

BCg—35 to 46 inches; grayish brown (10YR 5/2) silt loam stratified with silty clay loam and fine sandy loam; weak medium platy structure; friable; few faint gray (10YR 5/1) coatings on faces of peds; few faint very dark gray (10YR 3/1) iron and manganese stains on faces of peds; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

C—46 to 49 inches; brown (7.5YR 5/4) silty clay loam; massive; firm; common medium distinct dark yellowish brown (10YR 4/4) masses that have accumulated iron and are in the matrix; common medium prominent gray (5Y 5/1) iron depletions in the matrix; common medium and coarse white (10YR 8/1) masses that have accumulated calcium carbonate and are in the matrix; strongly effervescent; moderately alkaline; clear wavy boundary.

Cg—49 to 56 inches; grayish brown (10YR 5/2) fine sandy loam; massive; friable; common coarse prominent light olive brown (2.5Y 5/6) masses that have accumulated iron and are in the matrix; common coarse faint gray (10YR 5/1) iron depletions in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C´—56 to 80 inches; brown (10YR 4/3) loamy fine sand; single grain; loose; common coarse distinct grayish brown (2.5Y 5/2) iron depletions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to 50 inches
Depth to carbonates: 30 to 50 inches

Ap horizon:
Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 or 3
Texture—fine sandy loam

E horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 3 or 4
Texture—loamy fine sand, fine sandy loam

Bt or Btg horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, chroma of 2 to 6
Texture—silty clay loam, clay loam, silt loam, loam, sandy clay loam, fine sandy loam, sandy loam

BC or BCg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 6
Texture—silt loam, silty clay loam, fine sandy loam, loamy fine sand

C or Cg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 1 to 4
Texture—silt loam, silty clay loam, fine sandy loam, loamy fine sand

Wakeman Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Sandstone residuum
Landform: Lake plains and ground moraines
Position on the landform: Backslopes, shoulders, summits
Slope: 2 to 12 percent
Adjacent soils: Dekalb, Millgrove, Mitiwanga, Oakville

Taxonomic classification: Coarse-loamy, mixed, active, mesic Dystric Eutrochrepts

Typical Pedon

Wakeman sandy loam, 2 to 6 percent slopes; about 1 mile northeast of Berlin Heights, in Berlin Township; about 2,100 feet south of the intersection of Humm Road (Township Road 134) and Mason Road (County Road 13), along Humm Road, then 100 feet west; quadrangle 2; T. 5 N., R. 21 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; common fine and very fine roots; 10 percent rock fragments; moderately acid; clear wavy boundary.

Bw1—10 to 20 inches; yellowish brown (10YR 5/4) sandy loam; weak fine and medium subangular blocky structure; very friable; common fine and very fine roots; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; 5 percent rock fragments; slightly acid; clear wavy boundary.

Bw2—20 to 27 inches; yellowish brown (10YR 5/4) sandy loam; moderate fine and medium subangular blocky structure; friable; common fine roots; few distinct dark grayish brown (10YR 4/2) organic coatings and common distinct brown (7.5YR 4/4) coatings on faces of peds; 10 percent rock fragments; neutral; clear wavy boundary.

C—27 to 31 inches; yellowish brown (10YR 5/4) sandy loam; massive; friable; common fine roots; 10 percent rock fragments; neutral; abrupt smooth boundary.

R—31 to 33 inches; unweathered sandstone bedrock.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to sandstone bedrock: 20 to 40 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—sandy loam
Content of rock fragments—2 to 15 percent

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 to 6
Texture—sandy loam, fine sandy loam, loamy sand, loam, the gravelly or channery analogs of those textures
Content of rock fragments—5 to 30 percent

C horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—sandy loam; fine sandy loam; loam; the channery, very channery, or extremely channery analogs of those textures
Content of rock fragments—5 to 80 percent

Weyers Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately rapid in material weathered from tufa and moderately slow or slow in lacustrine deposits
Parent material: Calcareous tufa overlying lacustrine deposits
Landform: Lake plains
Position on the landform: Extensive flat areas near spring orifices
Slope: 0 to 1 percent
Adjacent soils: Sandusky, Toledo

Taxonomic classification: Coarse-loamy, carbonatic, mesic Fluvaquentic Endoaquolls

Typical Pedon

Weyers silt loam, 0 to 1 percent slopes; about 2 miles northwest of Castalia, in Margaretta Township; about 1,700 feet east of the intersection of Oxbo Road (Township Road 34) and Northwest Road (County Road 6), along Oxbo Road, then 550 feet south; quadrangle 3; T. 6 N., R. 24 W.

Ap—0 to 13 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine and medium granular structure; friable; common fine and medium roots; few shell fragments; 1 percent tufa fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.

Cg—13 to 20 inches; light brownish gray (2.5Y 6/2) gravelly loamy coarse sand; weak fine and medium granular structure; very friable; few very fine and medium roots; pockets of coarse sandy loam; few distinct black (10YR 2/1) organic coatings in root channels and pores; common coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; 20 percent tufa fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—20 to 37 inches; very pale brown (10YR 7/4) gravelly sandy loam; weak fine granular structure; very friable; few very fine and fine roots; 30 percent tufa fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—37 to 43 inches; pale brown (10YR 6/3) sandy loam; weak very coarse granular structure; very friable; few very fine and fine roots; 10 percent tufa fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.

2Oa—43 to 45 inches; black (10YR 2/1) muck; massive; friable; common very fine and fine roots; 5 percent fiber; neutral; abrupt smooth boundary.

3Cg1—45 to 54 inches; gray (10YR 5/1) silty clay loam; massive; firm; few very fine roots; common medium and coarse prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; slightly effervescent; slightly alkaline; clear wavy boundary.

3Cg2—54 to 80 inches; grayish brown (10YR 5/2) silty clay loam; massive; firm; common medium prominent strong brown (7.5YR 5/6) and brown (7.5YR 4/4) masses that have accumulated iron and are in the matrix; few very fine roots; few fine distinct black (10YR 2/1) iron and manganese concretions in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 17 inches
Depth to the 3C or 3Cg horizon: 40 to 60 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 or 2
Texture—silt loam
Content of tufa fragments—0 to 15 percent

Cg or C horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 8, chroma of 1 to 4
Texture—loamy coarse sand, loamy sand, sandy loam, coarse sandy loam, the gravelly or very gravelly analogs of those textures
Content of tufa fragments—1 to 60 percent

2Oa horizon:
Color—hue of 10YR or 7.5YR, value of 2 or 3, chroma of 1 or 2
Texture—sapric material

3Cg or 3C horizon:
Color—hue of 10YR to 5Y, value of 4 or 5, chroma of 1 to 4
Texture—silty clay loam; silty clay; strata of silt loam, fine sandy loam, very fine sandy loam

Zurich Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the solum
Parent material: Lacustrine deposits
Landform: Dissected areas on lake plains
Position on the landform: Backslopes, shoulders
Slope: 6 to 40 percent slopes
Adjacent soils: Ogontz, Algiers, Nolin

Taxonomic classification: Fine-silty, mixed, superactive, mesic Oxyaquic Hapludalfs

Typical Pedon

Zurich silt loam, 12 to 18 percent slopes, eroded; about 3 miles south of Huron, in Milan Township; about 1,750 feet south of the intersection of State Route 13 and Scheid Road (Township Road 12), along State Route 13, then 2,625 feet west; quadrangle 2; T. 5 N., R. 22 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; moderate medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

Bt1—9 to 14 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; many distinct brown (10YR 4/3) clay films and coatings on faces of peds; common medium faint brownish yellow (10YR 6/6) masses that have accumulated iron and are in the matrix; strongly acid; clear wavy boundary.

Bt2—14 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure parting to weak medium platy; friable; few fine roots; common distinct brown (10YR 4/3) clay films and coatings on faces of peds; many medium distinct pale brown (10YR 6/3) iron depletions in the matrix; common medium faint brownish yellow (10YR 6/6) masses that have accumulated iron and are in the matrix; neutral; clear wavy boundary.

C1—24 to 44 inches; olive brown (2.5Y 4/4) silt loam; massive; friable; few very fine roots; strata of fine sandy loam, loamy fine sand, and silty clay loam; common coarse prominent grayish brown (10YR 5/2) iron depletions in the matrix; common coarse prominent strong brown (7.5YR 5/6) masses that have accumulated iron and are in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—44 to 80 inches; light olive brown (2.5Y 5/4) stratified silt loam and fine sandy loam; massive; friable; many coarse prominent grayish brown (2.5Y 5/2) iron depletions in the matrix; common medium prominent yellowish brown (10YR 5/6) masses that have accumulated iron and are in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 47 inches
Depth to carbonates: 20 to 42 inches

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 3 or 4; value of 5 in eroded pedons
Texture—silt loam

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, silty clay loam

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 2 to 6
Texture—stratified silt loam, fine sandy loam, silty clay loam, loamy fine sand, very fine sand

Formation of the Soils

This section relates the major factors of soil formation to the soils of Erie County. It also describes some of the processes of soil formation.

Factors of Soil Formation

Soil is a three-dimensional natural body capable of supporting plant growth. The nature of the soil at a specific site is the result of the interaction of many factors and processes. The factors can be grouped into five general categories—parent material, climate, living organisms, relief, and time.

Climate and plants and animals have an effect on parent material that is modified by relief over time. Theoretically, if all of these factors were identical at different sites, the soils at these sites would be identical. Differences among the soils are caused by variations in one or more of these factors.

Parent Material

Parent material is the raw material acted on by the soil-forming processes. It largely determines soil texture, which in turn affects other properties, such as natural soil drainage and permeability. The physical and chemical composition of the parent material has an important effect on the kind of soil that forms.

The soils in Erie County formed in many different kinds of parent material. Most of the soils formed in material deposited by the glaciers that covered the area thousands of years ago or by the meltwater from these glaciers. Other soils formed in alluvium, which is material recently deposited by streams. In some areas the soils formed in glacial material over bedrock or in material weathered in place from bedrock. A few soils formed in organic material that resulted from the slow accumulation of plant residue in marshes or ponds over a period of thousands of years.

Till is material that was deposited directly by glacial ice. It typically has particles that vary in size, including sand, silt, clay, and some pebbles, cobbles, and larger rock fragments. The composition of the till depends on the nature of the area over which the ice passed before the till was deposited. Some of the material was transported great distances by the ice, but most of the material was of local origin. The till was deposited during the latest major glaciation, the Wisconsin Glaciation. Glacial till is the parent material of Amanda, Bennington, Cardington, Condit, Ellsworth, Mahoning, and Pewamo soils.

The till in Erie County is associated with ground moraines and lake plains. Most of the glacial till in the county was subject to modification by water action during various stages of lake formation during and after the Wisconsin Glaciation. Water-modified till primarily makes up the surficial deposits in the western and central parts of the county. Till deposits below a depth of 3 or 4 feet are massive, compact, and dense. The soils that formed in this kind of till generally are compact and are slowly or moderately slowly permeable.

Lacustrine deposits are lake-laid sediments that settled in a quiet water environment. The size of the particles that can be carried and suspended in water depends on the speed of the moving water. When the water slows to a given speed, the suspended particles that are larger than a given size will settle in the water. Water slows wherever a stream loses grade or flows into a body of still water. At that time, the coarser particles settle near the mouth of the stream and the silt and fine clay particles are carried further into the lake, where they slowly settle.

Clayey lacustrine deposits are in the northern part of Erie County. These deposits are in a large lake basin, known as Glacial Lake Maumee, that was formed by the melting glacier. Del Rey, Fulton, Shinrock, and Toledo soils formed in clayey lacustrine deposits near the present-day shoreline of Lake Erie.

Loamy and sandy materials were deposited by water or wave action along old lake shorelines or in deltas. Beach deposits occur in parallel ridges that mark the margins of different lake levels. Fox and Oshtemo soils formed in these kinds of materials. Where streams entered into the lake, small, localized deltas were prevalent. Colwood, Kibbie, and Tuscola soils formed in these areas.

Residuum from bedrock is of minor extent in Erie County. The glacial drift in the county is a few inches to several hundred feet thick. It is the dominant parent material, even in areas where the soils are shallow or moderately deep to bedrock. In a few areas, glaciers scoured the Earth's surface, leaving exposed bedrock that over time weathered into soil. Brecksville soils formed in material weathered from shale, and Dekalb and Wakeman soils formed in material weathered from sandstone. The lower part of the solum of Milton soils weathered from limestone.

In the western part of the county, karst topography with solution cavities in the limestone is prevalent. Subterranean springs or seepages surface in some areas. The release of carbonate-charged water from the spring orifices allows for the formation of calcareous tufa downslope from the orifice. Sandusky and Weyers soils formed in calcareous tufa and the underlying lacustrine sediments.

Recent alluvium is soil material deposited by floodwater along streams. The texture of the soil material varies, depending on the speed of the floodwater, the duration of flooding, and the distance from the streambank. Soils that formed in recent alluvium can be highly stratified. The soil horizons are weakly expressed because the soil-forming processes are interrupted with each new deposition. The source of the alluvium generally is material that eroded from upland soils farther upstream in the watershed. The well drained Tioga and somewhat poorly drained Orrville soils formed in recent alluvium derived from soils that formed in Wisconsin till and lacustrine deposits.

Organic soils formed in decomposed plant material that accumulated under water when ponds were filling with water. Ponds and marshes naturally age as they fill with organic material derived from algae, sedges, rushes, and other water-tolerant plants. The plant residue accumulates because the permanently wet condition of the soils prevents oxidation and slows decomposition. Freshly exposed organic material commonly has a reddish brown color that rapidly turns black when the material is exposed to the air. The very poorly drained Adrian soils formed in decomposed plant material and the underlying sandy deposits.

Climate

The climate in Erie County has significantly affected soil formation. Climatic factors, such as precipitation and temperature, have influenced the existing plant and animal communities and the physical and chemical weathering of the parent material.

During the colder glacial epoch, the advancing glaciers spread over the county. The cold temperatures in the soils reduced the rate of chemical reactions in the existing soil and in the raw parent material. Increased frost action, resulting from a periglacial climate, caused frost churning in some soils. When the glacial ice retreated and the climate gradually warmed, deciduous forests became established.

The county currently has a humid, temperate climate, which has persisted for thousands of years. In this climatic environment, physical and chemical weathering of the parent material can occur along with the accumulation of organic matter, the decomposition of minerals, the formation and translocation of clay, the leaching of soluble compounds, and alternating periods of freezing and thawing.

The range in temperature has favored both physical change and chemical weathering of the parent material. Freezing and thawing aided the formation of soil structure. Warm temperatures in summer favored chemical reactions in the weathering of the primary minerals. Rainfall and temperatures have been conducive to plant growth and the accumulation of organic matter in all of the soils.

Living Organisms

The vegetation under which a soil forms influences the color, structure, and content of organic matter. The surface layer of soils that formed under trees is generally lighter in color than that of soils formed under grass. A darker surface layer is formed under grass because more organic matter is returned to the soils by grasses than is returned to the soils by trees.

Gases derived from root respiration combine with water to form acids that influence the weathering of minerals. Grasses also provide shelter for many burrowing animals that alter the structure and thickness of soil horizons. Earthworms, burrowing insects, and small animals are constantly mixing the soil, making it more porous to air and water and adding organic residue. Bacteria, fungi, and other micro-organisms contribute to the breakdown of organic residue. Generally, fungi are more active in acid soils and bacteria in alkaline soils.

Six general native plant communities are recognized as the original vegetation of Erie County. The dominant type is mixed oak forest. It was in the western and central parts of the county. White oak, black oak, and hickory were the dominant species (Gordon 1969). This community was associated with Bennington, Cardington, Castalia, Dunbridge, Elnora, Kibbie, Milton, Pewamo, and Tuscola soils.

Elm-ash swamp forest was in the northwestern part of the county. American elm, black ash, red maple, pin oak, swamp white oak, and hickory were the principal species. This community was associated with Del Rey, Fulton, Milford, and Toledo soils.

Prairie grassland was in the central part of the county. Areas of this type of vegetation were likely wet prairies and were dominated by giant reedgrass, sloughgrass, bluejoint, and big bluestem. This community was associated with Colwood, Elliott, Fries, and Milford soils.

Beech forests were in the eastern portion of the county. Beech, sugar maple, red oak, white ash, white oak, and basswood were the common species. This community was associated with Bennington, Cardington, and Pewamo soils.

The mixed mesophytic forest community was in the east-central part of the county. In areas of this type of vegetation, no one species made up a large fraction of the community. Oak, beech, and maple were common species.

The marsh and fen plant community was along the Lake Erie shoreline. It included a wide variety of water-tolerant species. In areas with this type of vegetation, shrubs were common, but trees were rare. This community was associated with the very poorly drained, ponded Toledo soils.

Human activities also affect soil formation. Examples of these activities are cultivation, seeding, installation of drainage systems, irrigation, and cutting and filling. Accelerated erosion caused by clearing and cultivating the more sloping soils, such as Amanda, Cardington, Shinrock, and Zurich soils, illustrates the impact of human activities on soil formation. Loss of surface soil and compaction of the subsoil affect runoff and plant growth. In large areas, Pewamo, Milford, and Toledo soils have been drained by ditches and subsurface drains. Draining reduces the content of organic matter and affects the processes of soil formation. Adding lime or fertilizer also affects the long-term development of the soil.

Relief

Relief, along with parent material, affects the natural drainage of soils. It influences the amount of runoff, erosion, and the depth to the water table. Generally, the steeper soils have better drainage than the nearly level soils. If the extent of drainage differs, different soils can form in the same parent material. For example, both Cardington and Pewamo soils formed in glacial till. Cardington soils are in higher or more sloping positions than the Pewamo soils, and the water table generally is not close to the surface. Cardington soils are moderately well drained. Pewamo soils, however, are in low, level areas, and the water table is near or above the surface. Pewamo soils are very poorly drained.

A drainage sequence is a group of soils that formed in the same parent material but differ in the extent of natural drainage. For example, the well drained Saylesville soils, the moderately well drained Shinrock soils, the somewhat poorly drained Del Rey soils, and the very poorly drained and poorly drained Milford soils make up a drainage sequence. All of these soils formed in lacustrine deposits.

Relief varies only slightly in Erie County. On the lake plains, soils are dominantly nearly level. Exceptions are dissected areas along drainageways, areas on beach ridges, and areas where bedrock reefs occur.

Time

The length of time during which the parent material has been exposed to the soil-forming processes affects the nature of the soil that forms. In most instances, the youngest soils in the county are those that formed in recent stream deposits, such as Holly, Orrville, and Tioga soils. Exceptions are areas of altered soil materials, such as Udipsamments or Udorthents. Younger soils have horizons that are less well defined than those in the older soils.

The glacial deposits in Erie County are of Wisconsin age and are geologically young (about 20,000 years old). Nevertheless, sufficient time has elapsed for the active forces of climate and plants and animals to produce distinct horizons. In most of the soils, carbonates have been leached, structure has developed in the subsoil, and organic matter has accumulated in the surface layer.

Processes of Soil Formation

Soil forms through complex, continuing processes. These processes can be grouped into four general categories: addition, removal, transfer, and alteration.

The accumulation of organic matter in the formation of mineral soils is an example of the addition process. The addition of organic residue has produced a dark surface layer. The upper part of the parent material originally was not darker than the lower part.

The loss of lime from the upper 2 to 4 feet of many of the soils in Erie County is an example of the removal process. Although the parent material was limy, water percolating through the soil has leached the lime from the upper part of the soil.

Water is the carrier for most of the transfers that have occurred in the formation of soils in Erie County. Clay has been transferred from the A and E horizons to the B horizon in many of the soils. The A and E horizons, especially the E horizon, have become a zone of eluviation, and the B horizon is a zone of illuviation. Thin clay films are in pores and on the faces of peds in the B horizon of some soils. The presence of clay films is an important criterion in soil classification.

The reduction and solution of ferrous iron are examples of the alteration process. This process has taken place in the very poorly drained soils and, to a lesser extent, in somewhat poorly drained and moderately well drained soils. Reduction of iron, or gleying, is evident in the very poorly drained Colwood, Fries, Millgrove, and Pewamo soils. It is the result of a recurring water table. Gray soil indicates gleying. Reduced iron is soluble; however, the iron in the soils in Erie County commonly has remained in the horizon where it originated or settled in an underlying horizon. Iron can be reoxidized and segregated in places to form yellowish brown mottles that are brighter than the surrounding soil. The alteration of iron causes redoximorphic features in soils that are not well drained.

To varying degrees, each of the four soil-forming processes has affected all of the soils in Erie County. The accumulation of organic matter has been prominent in the formation of Adrian soils. The removal of carbonates and the transfer of clay have been prominent in the formation of Cardington and Shinrock soils.

References

American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 2001. Standard classification of soils for engineering purposes. ASTM Stand. D 2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. February 24, 1995. Hydric soils of the United States.

Gordon, Robert B. 1969. The natural vegetation of Ohio in pioneer days. Ohio Biological Survey.

Hurt, G.W., P.M. Whited, and R.F. Pringle, editors. 1996. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Ohio Department of Natural Resources, Division of Geological Survey. Rev. 1947. Geologic map of Ohio. Map No. 1. (Reprinted 1981)

Ohio Department of Natural Resources, Division of Geological Survey. 1998. Quaternary geology map of Ohio. Map No. 2.

Ohio Department of Natural Resources, Division of Water. 1986. Groundwater resources of Erie County, Ohio. Map.

Redmond, C.E., T.J.F. Hole, C.H. Innis, and M. Wachtman. 1971. Soil survey of Erie County, Ohio.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 1990. Keys to soil taxonomy. 4th edition. United States Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Staff. 1996. Keys to soil taxonomy. 7th edition. United States Department of Agriculture, Natural Resources Conservation Service. (Revised in 2003)

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (Available in the State Office of the Natural Resources Conservation Service at 200 N. High Street, Columbus, OH 43215-2478)

United States Department of Agriculture, Natural Resources Conservation Service. 1996. Natural resources inventory. (Available in the State Office of the Natural Resources Conservation Service at 200 N. High Street, Columbus, OH 43215-2478)

United States Department of Agriculture, Soil Conservation Service. 1987. Basic statistics, 1982 national resources inventory. Statistical Bulletin 756.

United States Department of Commerce, Bureau of the Census. 1990. 1990 census of population and housing.

United States Department of Commerce, Bureau of the Census. 1993. 1992 census of agriculture, final county file.

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; the air 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 granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslopes below.

Backswamp. A flood plain landform. Extensive, marshy, or swampy, depressed areas on flood plains between natural levees and the valley sides of terraces.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Beach deposit. The coarse textured or medium textured material, usually stratified, that is deposited by the action of waves and currents along a shoreline.

Beach ridge. A low, essentially continuous mound of beach or beach and dune material heaped up by the action of waves and currents on the backshore of a beach. The ridges are roughly parallel to the shoreline and represent successive positions of an advancing or retreating shoreline.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliquivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

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 depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Cut or fill spot (on legend). A disturbed area of soil from which material has been excavated or added. Typically, 0.25 acre to 2 acres in size. Classified and mapped as Udorthents when the area is more than 2 acres in size.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depression Any relatively sunken part of the Earth's surface; especially a lower lying area surrounded by higher ground.

Depression (or sink) (on legend). An area commonly 5 feet or more lower in elevation than the surrounding area. Side slopes generally range from 5 to 10 percent. Typically, a depression is 0.1 to 0.25 acre in size.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Dissimilar soil. Soils that do not share limits of diagnostic criteria. They behave and perform in a different manner and have different conservation needs or management requirements for the major land uses in the survey area.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Dolostone. A term for the sedimentary rock formerly called dolomite. A carbonate sedimentary rock consisting chiefly (more than 50 percent by weight) of the mineral dolomite.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that, at some time, move concentrated water and either do not have a defined channel or have a small, defined channel.

Dune. A low mound, ridge, bank, or hill of loose, windblown, granular material (generally sand), either bare or covered with vegetation, capable of movement from place to place but always retaining its characteristic shape.

Effervescence. The gaseous response (observed as bubbles) of soil to applied hydrochloric acid (HCl), H_2O_2, or other chemicals. A test to determine the presence of carbonates in the soil.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic).—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated).—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fan. A generic term for a constructional landform that is built of stratified material that has moved downslope from its source.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The inclined surface at the base of a hill.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter. Very gravelly soil material has 35 to 60 percent gravel, and extremely gravelly soil material has more than 60 percent gravel.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground moraine. An extensive, fairly even layer of till having an even or undulating surface; a deposit of rock and mineral debris dragged along, in, on, or beneath a glacier.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Krotovina. Irregular tubular streaks within one layer of material transported from another layer by filling of tunnels made by burrowing animals with material from outside the layer in which they are found.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Limestone. A sedimentary rock consisting chiefly (more than 50 percent) of calcium carbonate, primarily in the form of calcite.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Lithic contact. A boundary between soil and continuous, coherent, underlying material. The underlying material must be sufficiently coherent to make hand digging with a spade impractical.

Lithochromic color. Color that is derived from rock fragments in the soil or from the underlying bedrock.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength (in tables). The soil is not strong enough to support loads.

Marsh (or swamp). A saturated, very poorly drained area that is intermittently or permanently covered with water. Marsh areas are dominantly vegetated by aquatic or grasslike plants. Swamps are dominantly covered by trees or shrubs.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Milliquivalent (meq). A measurement unit of ion exchange capacity depicting one-thousandth of the actual numbers of atoms or molecules in an object.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Mine (or quarry). An open excavation from which bedrock material has been removed.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. 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 of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paralithic contact. Similar to a lithic contact except that the underlying material is softer and can be dug with difficulty with a spade.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pebbles. Rounded or partially rounded rock or mineral fragments between 2 and 75 mm in diameter.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Perennial stream. A stream that usually flows throughout the year.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Reef. A ridgelike or moundlike structure, layered or massive, built by sedentary calcareous organisms, and consisting mostly of their remains; it is wave resistant and stands above the surrounding contemporaneously deposited sediment.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. An exposure of bedrock at the surface of the earth.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy spot. An area of soil where the surface layer is sandy (loamy sand or sand) and where the surrounding soil or soils have a loamy or clayey surface layer.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slopes. An elongated area having slopes that are at least two slope classes steeper than the slope class of the surrounding map unit(s).

Shoulder slope. The hillslope position that forms the uppermost inclined surface near the top of a hillslope. If present, it comprises the transition zone from backslope to summit.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar components. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent or 0 to 3 percent
Nearly level to gently sloping	0 to 4 percent or 0 to 6 percent
Gently sloping	2 to 6 percent
Sloping	6 to 12 percent
Moderately steep	12 to 18 percent
Steep	18 to 25 percent or 25 to 40 percent
Very steep	40 to 70 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the Earth's surface. It is capable of supporting plants and 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.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in or composed of strata or layers.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. 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 without any regular cleavage, as in many hardpans).

Subsidence. The loss in volume that occurs in muck soils when they oxide or dry.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

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.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tufa. Material composed primarily of calcium carbonate. It is generally deposited by springs, near their orifices or vents.

Typical pedon site. The location of the pedon described as typical for the series within the county.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water table. The saturated zone in the soil.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the Earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wet spot. An area of soil that is somewhat poorly drained to very poorly drained and that is at least two drainage classes wetter than the named soils in the surrounding map units.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at Sandusky, Ohio.)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snow-fall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January--	32.2	17.5	24.8	60	-10	11	1.73	0.72	2.59	4	7.7
February-	34.3	19.3	26.8	63	-4	17	1.63	0.64	2.47	4	6.5
March----	44.3	28.9	36.6	78	8	81	2.61	1.59	3.54	6	4.7
April----	56.7	39.5	48.1	84	22	258	2.92	1.72	4.00	6	.8
May------	67.9	50.4	59.2	90	34	569	3.47	2.33	4.51	7	.0
June-----	78.0	60.2	69.1	95	46	864	3.85	2.11	5.38	6	.0
July-----	82.4	64.9	73.7	97	51	958	3.72	2.02	5.22	6	.0
August---	80.7	63.1	71.9	93	51	916	3.48	1.82	4.93	5	.0
September	74.0	56.2	65.1	92	40	723	3.17	1.82	4.38	6	.0
October--	62.3	44.7	53.5	84	27	404	2.04	1.00	3.08	5	.0
November-	49.9	35.4	42.6	74	17	151	2.80	1.38	4.03	6	1.6
December-	37.0	23.4	30.2	65	-2	28	2.56	1.69	3.52	6	6.1
Yearly:											
Average-	58.3	42.0	50.1	---	----	---	---	---	---	---	---
Extreme-	---	---	---	97	-11	---	---	---	---	---	---
Total---	---	---	---	---	----	4,981	33.98	27.61	38.35	67	27.4

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Sandusky, Ohio.)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than	Apr. 7	Apr. 14	Apr. 29
2 years in 10 later than	Apr. 2	Apr. 10	Apr. 25
5 years in 10 later than	Mar. 25	Apr. 2	Apr. 17
First freezing temperature in fall:			
1 year in 10 earlier than	Nov. 4	Oct. 22	Oct. 14
2 years in 10 earlier than	Nov. 9	Oct. 28	Oct. 19
5 years in 10 earlier than	Nov. 21	Nov. 7	Oct. 28

Table 3.--Growing Season

(Recorded in the period 1961-90 at Sandusky, Ohio.)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	208	201	172
8 years in 10	214	206	179
5 years in 10	226	215	192
2 years in 10	237	224	205
1 year in 10	243	229	211

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AaA	Adrian muck, 0 to 1 percent slopes	26	*
AeA	Algiers silt loam, 0 to 2 percent slopes	313	0.2
AkA	Allis clay loam, 0 to 2 percent slopes	4,094	2.3
AmD2	Amanda loam, 12 to 18 percent slopes, eroded	174	*
AnG	Amanda-Dekalb-Rock outcrop association, 40 to 70 percent slopes	788	0.4
Bc	Beaches	545	0.3
BdB	Belmore loam, 2 to 6 percent slopes	4	*
BeA	Bennington loam, 0 to 2 percent slopes	1,651	0.9
BgA	Bennington silt loam, 0 to 2 percent slopes	10,306	5.7
BgB	Bennington silt loam, 2 to 6 percent slopes	1,467	0.8
BkA	Bixler loamy fine sand, 0 to 2 percent slopes	3,057	1.7
BkB	Bixler loamy fine sand, 2 to 6 percent slopes	850	0.5
BvG	Brecksville silt loam, 40 to 70 percent slopes	287	0.2
CaA	Cardington silt loam, 0 to 2 percent slopes	67	*
CaB	Cardington silt loam, 2 to 6 percent slopes	2,331	1.3
CbC2	Cardington silty clay loam, 6 to 12 percent slopes, eroded	818	0.5
CcA	Castalia very channery loam, 0 to 2 percent slopes	1,855	1.0
CcB	Castalia very channery loam, 2 to 6 percent slopes	1,101	0.6
CcD	Castalia very channery loam, 12 to 18 percent slopes	154	*
ChB	Chili loam, loamy substratum, 2 to 6 percent slopes	568	0.3
CmA	Colwood loam, 0 to 1 percent slopes	4,383	2.4
CnA	Colwood silt loam, bedrock substratum, 0 to 1 percent slopes	1,430	0.8
CoA	Condit silt loam, 0 to 1 percent slopes	2,251	1.2
CtB	Conotton loam, 2 to 6 percent slopes	940	0.5
CuC	Conotton gravelly loam, 6 to 12 percent slopes	146	*
DbB	Dekalb channery loam, 2 to 6 percent slopes	582	0.3
DbD	Dekalb channery loam, 12 to 18 percent slopes	392	0.2
DeA	Del Rey silt loam, 0 to 2 percent slopes	6,551	3.6
DuA	Dunbridge loamy sand, 0 to 2 percent slopes	913	0.5
DuB	Dunbridge loamy sand, 2 to 6 percent slopes	679	0.4
EcA	Elliott silt loam, bedrock substratum, 0 to 2 percent slopes	1,195	0.7
EdB	Ellsworth silt loam, 2 to 6 percent slopes	125	*
EdC2	Ellsworth silt loam, 6 to 12 percent slopes, eroded	8	*
EnA	Elnora loamy fine sand, 0 to 4 percent slopes	6,383	3.5
EoA	Elnora loamy fine sand, bedrock substratum, 0 to 4 percent slopes	725	0.4
EsA	Endoaquents, loamy, 0 to 1 percent slopes	878	0.5
FnA	Fluvaquents, silty, 0 to 1 percent slopes, frequently flooded	537	0.3
FoB	Fox loam, 2 to 6 percent slopes	366	0.2
FrA	Fries silty clay loam, 0 to 1 percent slopes	2,225	1.2
FuA	Fulton silty clay loam, 0 to 2 percent slopes	2,166	1.2
GdA	Gilford fine sandy loam, 0 to 1 percent slopes	1,588	0.9
HdA	Harrod silt loam, 0 to 1 percent slopes, frequently flooded	145	*
HkA	Haskins loam, 0 to 2 percent slopes	3,214	1.8
HoA	Holly silt loam, 0 to 1 percent slopes, occasionally flooded	2,264	1.2
HpB	Hornell loam, 2 to 6 percent slopes	147	*
HrB	Hornell silt loam, 2 to 6 percent slopes	240	0.1
HsA	Hornell silty clay loam, 0 to 2 percent slopes	3,864	2.1
JtA	Jimtown loam, 0 to 2 percent slopes	3,271	1.8
JuA	Joliet silt loam, 0 to 1 percent slopes	727	0.4
KbA	Kibbie fine sandy loam, 0 to 2 percent slopes	7,707	4.2
MaA	Mahoning silt loam, 0 to 2 percent slopes	178	*
MaB	Mahoning silt loam, 2 to 6 percent slopes	69	*
MbB	Marblehead loam, 0 to 6 percent slopes	651	0.4
MeA	Mermill silty clay loam, 0 to 1 percent slopes	3,386	1.9
MfA	Milford silty clay loam, 0 to 1 percent slopes	4,315	2.4
MgA	Millgrove loam, 0 to 1 percent slopes	2,524	1.4
MmA	Millsdale silty clay loam, 0 to 1 percent slopes	2,089	1.2
MnA	Milton silt loam, 0 to 2 percent slopes	1,892	1.0
MnB	Milton silt loam, 2 to 6 percent slopes	489	0.3
MrA	Miner silty clay loam, 0 to 1 percent slopes	1,174	0.6
MsA	Miner silt loam, bedrock substratum, 0 to 1 percent slopes	974	0.5
MxA	Mitiwanga silt loam, 0 to 2 percent slopes	1,452	0.8
MxB	Mitiwanga silt loam, 2 to 6 percent slopes	272	0.1
NoA	Nolin silt loam, 0 to 2 percent slopes, occasionally flooded	576	0.3

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
OaB	Oakville loamy fine sand, 0 to 6 percent slopes	649	0.4
OgA	Ogontz fine sandy loam, 0 to 2 percent slopes	1,011	0.6
OhB	Ogontz silt loam, 2 to 6 percent slopes	1,511	0.8
OmA	Olmsted loam, 0 to 1 percent slopes	90	*
OpA	Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, occasionally flooded	2,406	1.3
OrA	Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, frequently flooded	385	0.2
OsB	Oshtemo loamy sand, 0 to 6 percent slopes	2,785	1.5
PcA	Pewamo silty clay loam, 0 to 1 percent slopes	12,799	7.0
Pg	Pits, gravel or sand	51	*
Pk	Pits, quarry	1,365	0.8
PmA	Plumbrook fine sandy loam, 0 to 2 percent slopes	2,254	1.2
RaA	Randolph silt loam, 0 to 2 percent slopes	1,814	1.0
RcA	Rawson sandy loam, 0 to 2 percent slopes	598	0.3
RcB	Rawson sandy loam, 2 to 6 percent slopes	1,110	0.6
RgA	Rimer loamy fine sand, 0 to 2 percent slopes	1,027	0.6
RhA	Ritchey loam, 0 to 2 percent slopes	1,030	0.6
RhB	Ritchey loam, 2 to 6 percent slopes	1,069	0.6
RhC	Ritchey loam, 6 to 12 percent slopes	214	0.1
SaA	Sandusky loam, 0 to 1 percent slopes	460	0.3
SbF	Saylesville silt loam, 25 to 40 percent slopes	1,083	0.6
ShB	Shinrock silt loam, 2 to 6 percent slopes	1,120	0.6
SkC2	Shinrock silty clay loam, 6 to 12 percent slopes, eroded	576	0.3
SkD2	Shinrock silty clay loam, 12 to 18 percent slopes, eroded	615	0.3
SpB	Spinks loamy fine sand, 0 to 6 percent slopes	1,152	0.6
SpD	Spinks loamy fine sand, 12 to 18 percent slopes	290	0.2
TgA	Tioga loam, 0 to 2 percent slopes, occasionally flooded	613	0.3
TnA	Toledo silty clay loam, 0 to 1 percent slopes	858	0.5
ToA	Toledo silty clay, 0 to 1 percent slopes	4,140	2.3
TpA	Toledo silty clay, 0 to 1 percent slopes, ponded	1,429	0.8
TuA	Tuscola fine sandy loam, 0 to 2 percent slopes	2,589	1.4
TuB	Tuscola fine sandy loam, 2 to 6 percent slopes	1,810	1.0
UcB	Udipsamments-Spinks complex, 0 to 6 percent slopes	293	0.2
UdB	Udorthents, loamy, 0 to 6 percent slopes	4,162	2.3
W	Water	14,973	8.2
WaB	Wakeman sandy loam, 2 to 6 percent slopes	561	0.3
WaC	Wakeman sandy loam, 6 to 12 percent slopes	140	*
WeA	Weyers silt loam, 0 to 1 percent slopes	2,160	1.2
ZuC2	Zurich silt loam, 6 to 12 percent slopes, eroded	1,182	0.7
ZuD2	Zurich silt loam, 12 to 18 percent slopes, eroded	1,534	0.8
ZuE2	Zurich silt loam, 18 to 25 percent slopes, eroded	274	0.2
ZuF	Zurich silt loam, 25 to 40 percent slopes	866	0.5
	Total	181,587	100.0

* Less than 0.05 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.8 percent of the survey area.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bluegrass-ladino
		Bu	Bu	Bu	Tons	AUM
AaA------------- Adrian	5W	---	---	---	---	---
AeA------------- Algiers	2W	125	40	45	4.1	4.6
AkA------------- Allis	4W	80	32	43	4.1	4.6
AmD2------------ Amanda	4E	---	---	35	3.6	4.0
AnG------------- Amanda-Dekalb-Rock outcrop	7E	---	---	---	---	---
Bc. Beaches						
BdB------------- Belmore	2E	105	35	45	4.5	5.0
BeA------------- Bennington	2W	120	40	45	4.3	5.3
BgA------------- Bennington	2W	120	40	45	4.3	5.3
BgB------------- Bennington	2E	110	35	42	3.8	5.0
BkA------------- Bixler	2W	105	38	44	4.0	5.0
BkB------------- Bixler	2E	100	34	42	3.8	4.8
BvG------------- Brecksville	7E	---	---	---	---	---
CaA------------- Cardington	1	120	42	46	4.5	5.0
CaB------------- Cardington	2E	110	36	42	3.7	4.5
CbC2------------ Cardington	3E	100	32	40	3.5	4.2
CcA------------- Castalia	3S	---	---	---	2.5	2.8
CcB------------- Castalia	3S	---	---	---	2.3	2.5
CcD------------- Castalia	6S	---	---	---	2.1	2.2
ChB------------- Chili	2E	105	38	42	4.5	5.0

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bluegrass-ladino
		Bu	Bu	Bu	Tons	AUM
CmA------------ Colwood	2W	155	55	67	4.5	5.3
CnA------------ Colwood	2W	140	44	55	4.5	5.3
CoA------------ Condit	3W	100	35	40	4.0	4.8
CtB------------ Conotton	3S	85	30	40	3.5	4.0
CuC------------ Conotton	4E	70	28	30	3.0	3.8
DbB------------ Dekalb	2E	80	26	30	3.0	3.5
DbD------------ Dekalb	4E	---	---	---	2.5	2.6
DeA------------ Del Rey	2W	120	44	50	4.3	5.3
DuA------------ Dunbridge	3S	100	32	40	3.5	4.0
DuB------------ Dunbridge	3E	90	28	38	3.3	3.8
EcA------------ Elliott	2W	135	45	60	5.1	5.3
EdB------------ Ellsworth	3E	90	33	42	3.7	4.5
EdC2----------- Ellsworth	4E	85	31	32	3.5	4.0
EnA------------ Elnora	2W	90	30	45	3.5	4.0
EoA------------ Elnora	2W	90	30	45	3.5	4.0
EsA. Endoaquents						
FnA. Fluvaquents						
FoB------------ Fox	2E	105	35	45	4.3	5.0
FrA------------ Fries	3W	95	35	40	4.0	4.5
FuA------------ Fulton	3W	110	38	46	4.0	5.3
GdA------------ Gilford	2W	130	42	55	4.0	5.0

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bluegrass-ladino
		Bu	Bu	Bu	Tons	AUM
HdA------------ Harrod	3W	100	40	---	4.1	4.5
HkA------------ Haskins	2W	115	44	46	4.3	5.3
HoA------------ Holly	3W	100	28	35	4.0	5.0
HpB------------ Hornell	3E	95	30	40	3.0	4.0
HrB------------ Hornell	3E	90	30	40	3.0	4.0
HsA------------ Hornell	3W	100	32	45	3.5	4.5
JtA------------ Jimtown	2W	110	40	45	4.3	5.3
JuA------------ Joliet	4W	80	32	35	2.0	2.5
KbA------------ Kibbie	2W	140	40	60	5.0	5.3
MaA------------ Mahoning	3W	100	32	40	4.3	5.3
MaB------------ Mahoning	3E	100	30	35	3.8	5.0
MbB------------ Marblehead	6S	---	---	---	2.0	2.0
MeA------------ Mermill	2W	140	47	58	4.5	5.3
MfA------------ Milford	2W	140	52	60	4.5	5.3
MgA------------ Millgrove	2W	150	55	60	4.5	5.3
MmA------------ Millsdale	3W	115	44	45	4.0	4.5
MnA------------ Milton	2S	100	35	40	3.8	4.0
MnB------------ Milton	2E	100	32	40	3.5	3.8
MrA------------ Miner	3W	115	40	45	4.2	4.5
MsA------------ Miner	3W	115	40	45	4.2	4.5
MxA------------ Mitiwanga	2W	100	30	45	3.8	4.5

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bluegrass-ladino
		Bu	Bu	Bu	Tons	AUM
MxB------------- Mitiwanga	2E	95	28	42	3.5	4.0
NoA------------- Nolin	2W	130	42	45	4.0	5.0
OaB------------- Oakville	4S	75	25	35	3.0	3.5
OgA------------- Ogontz	1	130	45	55	4.2	4.5
OhB------------- Ogantz	2E	120	38	52	4.0	4.5
OmA------------- Olmsted	2W	125	50	53	4.5	5.3
OpA------------- Orrville	2W	120	35	45	3.5	4.5
OrA------------- Orrville	2W	110	30	---	3.5	4.5
OsB------------- Oshtemo	3S	95	32	40	3.5	4.5
PcA------------- Pewamo	2W	140	44	55	5.0	5.3
Pg. Pits, gravel or sand						
Pk. Pits, quarry						
PmA------------- Plumbrook	2W	125	42	52	4.3	4.8
RaA------------- Randolph	3W	110	35	42	4.0	4.5
RcA------------- Rawson	1	125	42	52	4.5	5.0
RcB------------- Rawson	2E	110	40	48	4.2	5.0
RgA------------- Rimer	2W	105	38	45	4.0	5.0
RhA------------- Ritchey	3S	80	26	40	3.0	3.0
RhB------------- Ritchey	3E	75	24	35	2.5	2.5
RhC------------- Ritchey	4E	70	22	32	2.0	2.0
SaA------------- Sandusky	3W	120	40	40	4.0	4.2

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Bluegrass-ladino
		Bu	Bu	Bu	Tons	AUM
SbF------------- Saylesville	7E	---	---	---	---	---
ShB------------- Shinrock	2E	115	36	50	4.5	4.8
SkC2------------ Shinrock	3E	100	33	45	3.8	4.5
SkD2------------ Shinrock	4E	---	---	---	3.6	4.2
SpB------------- Spinks	3S	85	30	40	3.0	4.0
SpD------------- Spinks	4E	---	---	---	2.8	3.5
TgA------------- Tioga	2W	125	42	45	4.0	4.5
TnA------------- Toledo	3W	125	40	45	4.5	4.8
ToA------------- Toledo	3W	120	38	43	4.5	4.8
TpA------------- Toledo	4W	---	---	---	---	---
TuA------------- Tuscola	1	125	42	55	4.2	4.5
TuB------------- Tuscola	2E	120	38	50	4.0	4.3
UcB------------- Udipsamments-Spinks	4S	80	28	35	3.0	3.5
UdB. Udorthents						
WaB------------- Wakeman	2E	85	25	45	3.5	3.8
WaC------------- Wakeman	3E	80	23	40	3.5	3.5
WeA------------- Weyers	3W	120	40	42	4.0	4.2
ZuC2------------ Zurich	3E	100	35	45	4.0	4.5
ZuD2------------ Zurich	4E	---	---	---	3.6	4.2
ZuE2------------ Zurich	6E	---	---	---	3.5	3.7
ZuF------------- Zurich	7E	---	---	---	2.6	---

Table 6a.--Crop Yield Index

(Only the soils used as cropland are listed. See text for an explanation of the ratings in this table.)

Map symbol	Yield index
CmA:	
Colwood	100
MhA:	
Millgrove	96
MfA:	
Milford	91
MeA:	
Mermill	89
CnA:	
Colwood	87
PcA:	
Pewamo	87
KbA:	
Kibbie	87
EcA:	
Elliott	87
OgA:	
Ogontz	83
GdA:	
Gilford	82
OmA:	
Olmsted	82
PmA:	
Plumbrook	80
TuA:	
Tuscola	80
RcA:	
Rawson	79
NoA:	
Nolin	78
DeA:	
Del Rey	77
AeA:	
Algiers	76
TgA:	
Tioga	76
TnA:	
Toledo	76
OhB:	
Ogontz	76

Table 6a.--Crop Yield Index--Continued

Map symbol	Yield index
TuB:	
Tuscola	75
CaA:	
Cardington	75
HkA:	
Haskins	74
MmA:	
Millsdale	74
BeA:	
Bennington	74
BgA:	
Bennington	74
ToA:	
Toledo	73
ShB:	
Shinrock	73
WeA:	
Weyers	73
OpA:	
Orrville	72
MrA:	
Miner	72
MsA:	
Miner	72
SaA:	
Sandusky	72
RcB:	
Rawson	71
JtA:	
Jimtown	70
FtA:	
Fulton	70
BgB:	
Bennington	68
BkA:	
Bixler	68
CaB:	
Cardington	68
RaA:	
Randolph	68
RgA:	
Rimer	68
BdB:	
Belmore	67

Table 6a.--Crop Yield Index--Continued

Map symbol	Yield index
ChB:	
Chili	67
FoB:	
Fox	67
ZuC2:	
Zurich	65
SkC2:	
Shinrock	64
HsA:	
Hornell	64
BkB:	
Bixler	64
MnA:	
Milton	63
CoA:	
Condit	63
MxA:	
Mitiwanga	63
MnB:	
Milton	62
MaA:	
Mahoning	62
DuA:	
Dunbridge	62
CbC2:	
Cardington	62
FrA:	
Fries	61
MaB:	
Mahoning	60
MxB:	
Mitiwanga	60
HpB:	
Hornell	60
EdB:	
Ellsworth	60
OsB:	
Oshtemo	60
HoA:	
Holly	59
EnA:	
Elnora	59
EoA:	
Elnora	59

Table 6a.--Crop Yield Index--Continued

Map symbol	Yield index
HrB:	
Hornell	58
AkA:	
Allis	56
DuB:	
Dunbridge	56
CtB:	
Conotton	56
WaB:	
Wakeman	56
EdC2:	
Ellsworth	56
SpB:	
Spinks	56
OrA:	
Orrville	54
JoA:	
Joliet	53
RhA:	
Ritchey	53
WaC:	
Wakeman	52
HdA:	
Harrod	50
OaB:	
Oakville	49
DdB:	
Dekalb	49
CuC:	
Conotton	46
RhB:	
Ritchey	46
RhC:	
Ritchey	45
UcB:	
Udipsamments-Spinks	40

Table 6b.--Hay and Pasture Yield Index

(Only the soils used for hay and pasture are listed. They are ranked on combined yields for bluegrass-ladino pasture and orchardgrass-alfalfa hay. These soils are not used as cropland.)

Map symbol	Yield index
ZuD2:	
Zurich-------------	7.8
SkD2:	
Shinrock-----------	7.8
AmD2:	
Amanda-------------	7.6
ZuE2:	
Zurich-------------	7.2
SpD:	
Spinks-------------	6.3
CcA:	
Castalia-----------	5.3
DdD:	
Dekalb-------------	5.1
CcB:	
Castalia-----------	4.8
CcD:	
Castalia-----------	4.3
MbB:	
Marblehead---------	4.0

Table 7.--Main Cropland Limitations and Hazards

(Only the soils suited to cropland are included in this table. See text for a description of the limitations and hazards listed in this table and the specific criteria used to generate the listings.)

Soil name and map symbol	Cropland limitations and hazards
AeA:	
Algiers	High potential for ground-water pollution Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
AkA:	
Allis	High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content
AmD2:	
Amanda	Easily eroded Slope Part of surface layer removed Fair tilth Limited organic matter content
BdB:	
Belmore	High potential for ground-water pollution Excessive permeability Limited organic matter content
BeA:	
Bennington	Root-restricting layer Seasonal high water table Limited organic matter content Frost heave
BgA:	
Bennington	Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
BgB:	
Bennington	Easily eroded Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
BkA:	
Bixler	High potential for ground-water pollution Excessive permeability Seasonal high water table Limited organic matter content Frost heave Wind erosion

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
BkB:	
Bixler	High potential for ground-water pollution Excessive permeability Seasonal high water table Limited organic matter content Frost heave Wind erosion
CaA:	
Cardington	Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
CaB:	
Cardington	Easily eroded Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
CbC2:	
Cardington	Easily eroded Part of surface layer removed Root-restricting layer Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave
CcA:	
Castalia	High potential for ground-water pollution Limited available water capacity Depth to rock Excessive permeability Surface rock fragments
CcB:	
Castalia	High potential for ground-water pollution Limited available water capacity Depth to rock Excessive permeability Surface rock fragments
CcD:	
Castalia	High potential for ground-water pollution Limited available water capacity Depth to rock Excessive permeability Surface rock fragments Slope
ChB:	
Chili	Moderate potential for ground-water pollution Limited organic matter content
CmA:	
Colwood	Ponding High potential for ground-water pollution Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
CnA:	
Colwood	Ponding High potential for ground-water pollution Surface compaction Frost heave
CoA:	
Condit	Ponding Surface compaction Surface crusting Limited organic matter content Frost heave
CtB:	
Conotton	High potential for ground-water pollution Limited available water capacity Excessive permeability Limited organic matter content
CuC:	
Conotton	High potential for ground-water pollution Easily eroded Limited available water capacity Excessive permeability Limited organic matter content
DbB:	
Dekalb	High potential for ground-water pollution Limited available water capacity Depth to rock Excessive permeability Limited organic matter content
DbD:	
Dekalb	High potential for ground-water pollution Easily eroded Slope Limited available water capacity Depth to rock Excessive permeability Limited organic matter content
DeA:	
Del Rey	Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
DuA:	
Dunbridge	High potential for ground-water pollution Limited available water capacity Depth to rock Excessive permeability Limited organic matter content Wind erosion
DuB:	
Dunbridge	High potential for ground-water pollution Limited available water capacity Depth to rock Excessive permeability Limited organic matter content Wind erosion

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
EcA:	
Elliott	Seasonal high water table Surface compaction Frost heave
EdB:	
Ellsworth	Easily eroded Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
EdC2:	
Ellsworth	Easily eroded Part of surface layer removed Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave Root-restricting layer
EnA:	
Elnora	High potential for ground-water pollution Limited available water capacity Excessive permeability Seasonal high water table Wind erosion Limited organic matter content
EoA:	
Elnora	High potential for ground-water pollution Limited available water capacity Excessive permeability Seasonal high water table Wind erosion Limited organic matter content
FoB:	
Fox	High potential for ground-water pollution Easily eroded Excessive permeability Limited organic matter content
FrA:	
Fries	Ponding High potential for ground-water pollution Limited available water capacity Depth to rock Surface compaction Fair tilth
FuA:	
Fulton	Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content
GdA:	
Gilford	Ponding High potential for ground-water pollution Excessive permeability Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
HdA:	
Harrod	Frequent flooding High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Frost heave
HkA:	
Haskins	Root-restricting layer Seasonal high water table Limited organic matter content Frost heave
HoA:	
Holly	Occasional flooding High potential for ground-water pollution Seasonal high water table Surface compaction Frost heave
HpB:	
Hornell	High potential for ground-water pollution Easily eroded Limited available water capacity Depth to rock Seasonal high water table Limited organic matter content Frost heave
HrB:	
Hornell	High potential for ground-water pollution Easily eroded Limited available water capacity Depth to rock Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
HsA:	
Hornell	High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave
JtA:	
Jimtown	High potential for ground-water pollution Seasonal high water table Limited organic matter content Frost heave
JuA:	
Joliet	High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
KbA:	
Kibbie	High potential for ground-water pollution Seasonal high water table Frost heave
MaA:	
Mahoning	Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
MaB:	
Mahoning	Easily eroded Root-restricting layer Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
MbB:	
Marblehead	High potential for ground-water pollution Limited available water capacity Depth to rock
MeA:	
Mermill	Ponding Root-restricting layer Surface compaction Fair tilth Frost heave
MfA:	
Milford	Ponding High potential for ground-water pollution Surface compaction Poor tilth Frost heave
MgA:	
Millgrove	Ponding High potential for ground-water pollution Frost heave
MmA:	
Millsdale	Ponding High potential for ground-water pollution Limited available water capacity Depth to rock Surface compaction Fair tilth Frost heave
MnA:	
Milton	High potential for ground-water pollution Limited available water capacity Depth to rock Surface compaction Surface crusting Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
MnB:	
Milton	High potential for ground-water pollution Easily eroded Limited available water capacity Depth to rock Surface compaction Surface crusting Limited organic matter content
MrA:	
Miner	Ponding Surface compaction Fair tilth Frost heave
MsA:	
Miner	Ponding High potential for ground-water pollution Surface compaction Fair tilth Frost heave
MxA:	
Mitiwanga	High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
MxB:	
Mitiwanga	High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
NoA:	
Nolin	Occasional flooding High potential for ground-water pollution Surface compaction Surface crusting Limited organic matter content Frost heave
OaB:	
Oakville	High potential for ground-water pollution Limited available water capacity Excessive permeability Limited organic matter content Wind erosion
OgA:	
Ogontz	High potential for ground-water pollution Seasonal high water table Limited organic matter content Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
OhB:	
Ogontz	High potential for ground-water pollution Easily eroded Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
OmA:	
Olmsted	Ponding High potential for ground-water pollution Frost heave
OpA:	
Orrville	Occasional flooding High potential for ground-water pollution Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
OrA:	
Orrville	Frequent flooding High potential for ground-water pollution Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
OsB:	
Oshtemo	High potential for ground-water pollution Excessive permeability Limited organic matter content Wind erosion
PcA:	
Pewamo	Ponding High potential for ground-water pollution Surface compaction Fair tilth Frost heave
PmA:	
Plumbrook	Seasonal high water table Frost heave
RaA:	
Randolph	High potential for ground-water pollution Limited available water capacity Depth to rock Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
RcA:	
Rawson	Root-restricting layer Limited organic matter content
RcB:	
Rawson	Root-restricting layer Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
RgA:	
Rimer	High potential for ground-water pollution Root-restricting layer Limited available water capacity Excessive permeability Seasonal high water table Limited organic matter content Frost heave Wind erosion
RhA:	
Ritchey	High potential for ground-water pollution Limited available water capacity Depth to rock Limited organic matter content
RhB:	
Ritchey	High potential for ground-water pollution Easily eroded Limited available water capacity Depth to rock Limited organic matter content
RhC:	
Ritchey	High potential for ground-water pollution Easily eroded Limited available water capacity Depth to rock Limited organic matter content
SaA:	
Sandusky	High potential for ground-water pollution Seasonal high water table Frost heave
ShB:	
Shinrock	Easily eroded Seasonal high water table Surface compaction Surface crusting Limited organic matter content Frost heave
SkC2:	
Shinrock	Easily eroded Part of surface layer removed Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave
SkD2:	
Shinrock	Easily eroded Slope Part of surface layer removed Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
SpB:	
Spinks	High potential for ground-water pollution Limited available water capacity Excessive permeability Limited organic matter content Wind erosion
SpD:	
Spinks	High potential for ground-water pollution Easily eroded Slope Limited available water capacity Excessive permeability Limited organic matter content Wind erosion
TgA:	
Tioga	Occasional flooding High potential for ground-water pollution Limited organic matter content
TnA:	
Toledo	Ponding High potential for ground-water pollution Surface compaction Fair tilth Frost heave
ToA:	
Toledo	Ponding High potential for ground-water pollution Surface compaction Poor tilth Frost heave
TpA:	
Toledo	Ponding for extended periods High potential for ground-water pollution Surface compaction Poor tilth Frost heave
TuA:	
Tuscola	High potential for ground-water pollution Excessive permeability Seasonal high water table Limited organic matter content Frost heave
TuB:	
Tuscola	High potential for ground-water pollution Excessive permeability Seasonal high water table Limited organic matter content Frost heave
UcB:	
Udipsamments.	
Spinks	High potential for ground-water pollution Limited available water capacity Excessive permeability Limited organic matter content Wind erosion

Table 7.--Main Cropland Limitations and Hazards--Continued

Soil name and map symbol	Cropland limitations and hazards
WaB:	
Wakeman	High potential for ground-water pollution Limited available water capacity Depth to rock Limited organic matter content
WaC:	
Wakeman	High potential for ground-water pollution Easily eroded Limited available water capacity Depth to rock Limited organic matter content
WeA:	
Weyers	High potential for ground-water pollution Seasonal high water table Surface compaction Frost heave
ZuC2:	
Zurich	High potential for ground-water pollution Easily eroded Part of surface layer removed Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave
ZuD2:	
Zurich	High potential for ground-water pollution Easily eroded Slope Part of surface layer removed Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave
ZuE2:	
Zurich	High potential for ground-water pollution Easily eroded Slope Part of surface layer removed Surface compaction Fair tilth Surface crusting Limited organic matter content Frost heave

Table 8.--Capability Classes and Subclasses

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage.)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (E)	Wetness (W)	Soil problems (S)
	Acres	Acres	Acres	Acres
I	4,265	---	---	---
II	98,534	13,041	83,601	1,892
III	41,583	4,366	26,762	10,455
IV	10,565	3,373	6,250	942
V	26	---	26	---
VI	1,079	274	---	805
VII	3,024	3,024	---	---
VIII	---	---	---	---

Table 9.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Soil name
AeA	Algiers silt loam, 0 to 2 percent slopes (where drained)
BdB	Belmore loam, 2 to 6 percent slopes
BeA	Bennington loam, 0 to 2 percent slopes (where drained)
BgA	Bennington silt loam, 0 to 2 percent slopes (where drained)
BgB	Bennington silt loam, 2 to 6 percent slopes (where drained)
BkA	Bixler loamy fine sand, 0 to 2 percent slopes (where drained)
BkB	Bixler loamy fine sand, 2 to 6 percent slopes (where drained)
CaA	Cardington silt loam, 0 to 2 percent slopes
CaB	Cardington silt loam, 2 to 6 percent slopes
ChB	Chili loam, loamy substratum, 2 to 6 percent slopes
CmA	Colwood loam, 0 to 1 percent slopes (where drained)
CnA	Colwood silt loam, bedrock substratum, 0 to 1 percent slopes (where drained)
CoA	Condit silt loam, 0 to 1 percent slopes (where drained)
CtB	Conotton loam, 2 to 6 percent slopes
DeA	Del Rey silt loam, 0 to 2 percent slopes (where drained)
DuA	Dunbridge loamy sand, 0 to 2 percent slopes
DuB	Dunbridge loamy sand, 2 to 6 percent slopes
EcA	Elliott silt loam, bedrock substratum, 0 to 2 percent slopes (where drained)
EdB	Ellsworth silt loam, 2 to 6 percent slopes
FoB	Fox loam, 2 to 6 percent slopes
FrA	Fries silty clay loam, 0 to 1 percent slopes (where drained)
FuA	Fulton silty clay loam, 0 to 2 percent slopes (where drained)
GdA	Gilford fine sandy loam, 0 to 1 percent slopes (where drained)
HdA	Harrod silt loam, 0 to 1 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
HkA	Haskins loam, 0 to 2 percent slopes (where drained)
HoA	Holly silt loam, 0 to 1 percent slopes, occasionally flooded (where drained)
HpB	Hornell loam, 2 to 6 percent slopes (where drained)
HrB	Hornell silt loam, 2 to 6 percent slopes (where drained)
HsA	Hornell silty clay loam, 0 to 2 percent slopes (where drained)
JtA	Jimtown loam, 0 to 2 percent slopes (where drained)
JuA	Joliet silt loam, 0 to 1 percent slopes (where drained)
KbA	Kibbie fine sandy loam, 0 to 2 percent slopes (where drained)
MaA	Mahoning silt loam, 0 to 2 percent slopes (where drained)
MaB	Mahoning silt loam, 2 to 6 percent slopes (where drained)
MeA	Mermill silty clay loam, 0 to 1 percent slopes (where drained)
MfA	Milford silty clay loam, 0 to 1 percent slopes (where drained)
MgA	Millgrove loam, 0 to 1 percent slopes (where drained)
MmA	Millsdale silty clay loam, 0 to 1 percent slopes (where drained)
MnA	Milton silt loam, 0 to 2 percent slopes
MnB	Milton silt loam, 2 to 6 percent slopes
MrA	Miner silty clay loam, 0 to 1 percent slopes (where drained)
MsA	Miner silt loam, bedrock substratum, 0 to 1 percent slopes (where drained)
MxA	Mitiwanga silt loam, 0 to 2 percent slopes (where drained)
MxB	Mitiwanga silt loam, 2 to 6 percent slopes (where drained)
NoA	Nolin silt loam, 0 to 2 percent slopes, occasionally flooded
OgA	Ogontz fine sandy loam, 0 to 2 percent slopes
OhB	Ogontz silt loam, 2 to 6 percent slopes
OmA	Olmsted loam, 0 to 1 percent slopes (where drained)
OpA	Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, occasionally flooded (where drained)
OrA	Orrville silt loam, bedrock substratum, 0 to 2 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
OsB	Oshtemo loamy sand, 0 to 6 percent slopes
PcA	Pewamo silty clay loam, 0 to 1 percent slopes (where drained)
PmA	Plumbrook fine sandy loam, 0 to 2 percent slopes (where drained)
RaA	Randolph silt loam, 0 to 2 percent slopes (where drained)
RcA	Rawson sandy loam, 0 to 2 percent slopes
RcB	Rawson sandy loam, 2 to 6 percent slopes
RgA	Rimer loamy fine sand, 0 to 2 percent slopes (where drained)

Table 9.--Prime Farmland--Continued

Map symbol	Soil name
SaA	Sandusky loam, 0 to 1 percent slopes (where drained)
ShB	Shinrock silt loam, 2 to 6 percent slopes
TgA	Tioga loam, 0 to 2 percent slopes, occasionally flooded
TnA	Toledo silty clay loam, 0 to 1 percent slopes (where drained)
ToA	Toledo silty clay, 0 to 1 percent slopes (where drained)
TuA	Tuscola fine sandy loam, 0 to 2 percent slopes
TuB	Tuscola fine sandy loam, 2 to 6 percent slopes
WaB	Wakeman sandy loam, 2 to 6 percent slopes
WeA	Weyers silt loam, 0 to 1 percent slopes (where drained)

Table 10.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed.)

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
AaA:										
Adrian	2W	Slight	Severe	Severe	Severe	Severe	Black willow	---	---	---
							Silver maple	76	29	
							White ash	51	29	
AeA:										
Algiers	4A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Northern red oak	76	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
							Yellow poplar	---	---	
AkA:										
Allis	2W	Slight	Severe	Severe	Moderate	Severe	Eastern white pine	55	86	Northern white-cedar, white spruce
							Red maple	50	29	
AmD2:										
Amanda	5R	Moderate	Moderate	Slight	Slight	Severe	Black cherry	---	---	Black walnut, eastern white pine, northern red oak, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	87	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
AnG:										
Amanda	5R	Severe	Severe	Severe	Slight	Severe	Black cherry	---	---	Black walnut, eastern white pine, northern red oak, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	87	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
Dekalb	2R	Severe	Severe	Severe	Moderate	Moderate	Northern red oak	57	43	Norway spruce, eastern white pine, white spruce
Rock outcrop.										

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
BdB:										
Belmore	4A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	Austrian pine, black walnut, eastern white pine, northern red oak, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
BeA:										
Bennington	4A	Slight	Slight	Moderate	Slight	Severe	Austrian pine	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Black cherry	---	---	
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
BgA:										
Bennington	4A	Slight	Slight	Moderate	Slight	Severe	Austrian pine	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Black cherry	---	---	
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
BgB:										
Bennington	4A	Slight	Slight	Moderate	Slight	Severe	Austrian pine	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Black cherry	---	---	
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
BkA:										
Bixler	4S	Slight	Slight	Moderate	Slight	Moderate	Black oak	---	---	Black oak, green ash, northern red oak, tuliptree, white ash
							Bur oak	---	---	
							Green ash	---	---	
							Northern red oak	---	---	
							Quaking aspen	---	---	
							Red maple	---	---	
							Slippery elm	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
BkB:										
Bixler------------------	4S	Slight	Slight	Moderate	Slight	Moderate	Black oak-----------	---	---	Black oak, green ash, northern red oak, tuliptree, white ash
							Bur oak-------------	---	---	
							Green ash-----------	---	---	
							Northern red oak----	80	57	
							Quaking aspen-------	---	---	
							Red maple-----------	---	---	
							Slippery elm--------	---	---	
BvG:										
Brecksville-------------	4R	Severe	Severe	Moderate	Moderate	Moderate	Black cherry--------	---	---	Black walnut, eastern white pine, northern red oak, tuliptree, white ash, white oak
							Black walnut--------	---	---	
							Northern red oak----	70	57	
							Sugar maple---------	---	---	
							Tuliptree-----------	---	---	
							White ash-----------	---	---	
							White oak-----------	65	43	
CaA:										
Cardington--------------	4A	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Northern red oak----	80	57	
							Sugar maple---------	---	---	
							Tuliptree-----------	---	---	
							White ash-----------	---	---	
							White oak-----------	75	57	
CaB:										
Cardington--------------	4A	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Northern red oak----	80	57	
							Sugar maple---------	---	---	
							Tuliptree-----------	---	---	
							White ash-----------	---	---	
							White oak-----------	75	57	
CbC2:										
Cardington--------------	4A	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Northern red oak----	80	57	
							Sugar maple---------	---	---	
							Tuliptree-----------	---	---	
							White ash-----------	---	---	
							White oak-----------	75	57	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
CcA:										
Castalia	2D	Slight	Moderate	Moderate	Moderate	Slight	Black cherry	---	---	Black oak, eastern white pine, red pine, tuliptree, white ash
							Black oak	50	29	
							Red maple	---	---	
							Scarlet oak	---	---	
							Tuliptree	---	---	
CcB:										
Castalia	2D	Slight	Moderate	Moderate	Moderate	Slight	Black cherry	---	---	Black oak, eastern white pine, red pine, tuliptree, white ash
							Black oak	50	29	
							Red maple	---	---	
							Scarlet oak	---	---	
							Tuliptree	---	---	
CcD:										
Castalia	2R	Slight	Moderate	Moderate	Moderate	Slight	Black cherry	---	---	Black oak, eastern white pine, red pine, tuliptree, white ash
							Black oak	50	29	
							Red maple	---	---	
							Scarlet oak	---	---	
							Tuliptree	---	---	
ChB:										
Chili	4A	Slight	Slight	Slight	Slight	Moderate	Black cherry	---	---	Black walnut, eastern white pine, northern red oak, red pine, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	85	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	80	57	
CmA:										
Colwood	5W	Slight	Severe	Severe	Severe	Severe	Pin oak	90	72	White ash
							Red maple	---	---	
							Swamp white oak	90	72	
							White ash	---	---	
CnA:										
Colwood	5W	Slight	Severe	Severe	Severe	Severe	Pin oak	90	72	White ash
							Red maple	---	---	
							Swamp white oak	90	72	
							White ash	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
CoA:										
Condit	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, red maple, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	90	72	
							Red maple	---	---	
							Swamp white oak	---	---	
CtB:										
Conotton	4F	Slight	Slight	Moderate	Slight	Moderate	Black cherry	---	---	Black oak, eastern white pine, tuliptree, white ash
							Black oak	---	---	
							Northern red oak	70	57	
							Red maple	---	---	
							Scarlet oak	---	---	
							Tuliptree	---	---	
							White oak	70	57	
CuC:										
Conotton	4F	Slight	Slight	Moderate	Slight	Moderate	Black cherry	---	---	Black oak, eastern white pine, tuliptree, white ash
							Black oak	---	---	
							Northern red oak	70	57	
							Red maple	---	---	
							Scarlet oak	---	---	
							Tuliptree	---	---	
							White oak	70	57	
DbB:										
Dekalb	3F	Slight	Slight	Moderate	Moderate	Moderate	Northern red oak	57	43	Austrian pine, Japanese larch, eastern white pine, red pine
DbD:										
Dekalb	2R	Slight	Moderate	Moderate	Moderate	Moderate	Northern red oak	52	29	Norway spruce, eastern white pine, white spruce
DeA:										
Del Rey	4C	Slight	Slight	Moderate	Slight	Severe	Bur oak	---	---	Austrian pine, eastern redcedar, green ash, pin oak, red maple
							Green ash	---	---	
							Northern red oak	70	57	
							White oak	70	57	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber (cu ft/ac)	Trees to manage
DuA: Dunbridge	4D	Slight	Slight	Moderate	Moderate	Moderate	Black cherry	---	---	Black walnut, eastern white pine, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	75	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	70	57	
DuB: Dunbridge	4D	Slight	Slight	Moderate	Moderate	Moderate	Black cherry	---	---	Black walnut, eastern white pine, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	75	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	70	57	
EdB: Ellsworth	4A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	Black walnut, eastern white pine, white ash
							Black walnut	---	---	
							Northern red oak	70	57	
							Sugar maple	---	---	
							Tuliptree	80	72	
							White ash	---	---	
							White oak	70	57	
EdC2: Ellsworth	4A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	Black walnut, eastern white pine, white ash
							Black walnut	---	---	
							Northern red oak	70	57	
							Sugar maple	---	---	
							Tuliptree	80	72	
							White ash	---	---	
							White oak	70	57	
EnA: Elnora	3S	Slight	Slight	Severe	Slight	Moderate	Eastern white pine	65	114	Eastern white pine
							Northern red oak	60	43	
							Sugar maple	55	29	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
EoA:										
Elnora	3S	Slight	Slight	Severe	Slight	Moderate	Eastern white pine	65	114	Eastern white pine
							Northern red oak	60	43	
							Sugar maple	55	29	
FoB:										
Fox	4A	Slight	Slight	Slight	Slight	Moderate	Black cherry	---	---	Black locust, eastern white pine, tuliptree, white ash
							Northern red oak	80	57	
							Sugar maple	---	---	
							White ash	---	---	
							White oak	---	---	
FrA:										
Fries	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	85	72	
							Red maple	---	---	
							Swamp white oak	---	---	
FuA:										
Fulton	4C	Slight	Slight	Moderate	Moderate	Severe	American beech	---	---	American sycamore, Austrian pine, eastern cottonwood, green ash, pin oak, red maple
							Black cherry	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
GdA:										
Gilford	4W	Slight	Severe	Severe	Severe	Severe	Eastern white pine	55	100	Eastern cottonwood, eastern white pine, red maple, white ash
							Pin oak	70	57	
							Red maple	60	43	
HdA:										
Harrod	5D	Slight	Severe	Moderate	Moderate	Severe	Green ash	---	---	Green ash, red maple, silver maple, swamp white oak
							Pin oak	85	72	
							Red maple	---	---	
							Swamp white oak	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
HkA:										
Haskins	4A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	American sycamore, black cherry, eastern white pine, green ash, northern red oak, white ash
							Northern red oak	80	57	
							Pin oak	90	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	75	57	
HoA:										
Holly	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	90	72	
							Red maple	---	---	
							Swamp white oak	---	---	
HpB:										
Hornell	3W	Slight	Moderate	Moderate	Moderate	Severe	Northern red oak	70	57	Eastern white pine, northern red oak, white ash, white spruce
							Sugar maple	60	43	
							White ash	70	29	
HrB:										
Hornell	3W	Slight	Moderate	Moderate	Moderate	Severe	Northern red oak	70	57	Eastern white pine, northern red oak, white ash, white spruce
							Sugar maple	60	43	
							White ash	70	29	
HsA:										
Hornell	3W	Slight	Moderate	Moderate	Moderate	Severe	Northern red oak	70	57	Eastern white pine, northern red oak, white ash, white spruce
							Sugar maple	60	43	
							White ash	70	29	
JtA:										
Jimtown	5A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	American sycamore, Scotch pine, black cherry, eastern white pine, northern red oak, white ash
							Northern red oak	85	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
KbA:										
Kibbie	5A	Slight	Slight	Moderate	Slight	Severe	Eastern cottonwood	---	---	Eastern white pine, white ash
							Northern red oak	---	---	
							Pin oak	90	72	
							White ash	---	---	
MaA:										
Mahoning	5C	Slight	Slight	Moderate	Moderate	Severe	Black cherry	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple
							Pin oak	88	72	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
MaB:										
Mahoning	5C	Slight	Slight	Moderate	Moderate	Severe	Black cherry	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple
							Pin oak	88	72	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
MbB:										
Marblehead	2D	Slight	Slight	Severe	Severe	Slight	Black cherry	---	---	Black oak, eastern white pine, tuliptree, white ash
							Black oak	45	29	
							Red maple	---	---	
							Scarlet oak	---	---	
							Tuliptree	---	---	
MeA:										
Mermill	5W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, swamp white oak, sweetgum
							Green ash	---	---	
							Pin oak	90	72	
							Red maple	---	---	
							Swamp white oak	90	72	
MgA:										
Millgrove	5W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Green ash	---	---	
							Pin oak	86	72	
							Red maple	---	---	
							Swamp white oak	85	72	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
MmA:										
Millsdale	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, swamp white oak, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	86	72	
							Red maple	---	---	
							Swamp white oak	---	---	
MnA:										
Milton	4D	Slight	Slight	Slight	Moderate	Moderate	Black cherry	---	---	Black walnut, eastern white pine, northern red oak, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	95	100	
							White ash	---	---	
							White oak	---	---	
MnB:										
Milton	4D	Slight	Slight	Slight	Moderate	Moderate	Black cherry	---	---	Black walnut, eastern white pine, northern red oak, tuliptree, white ash, white oak
							Black walnut	---	---	
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	95	100	
							White ash	---	---	
							White oak	---	---	
MrA:										
Miner	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	86	72	
							Red maple	---	---	
							Swamp white oak	---	---	
MsA:										
Miner	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	86	72	
							Red maple	---	---	
							Swamp white oak	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
MxA:										
Mitiwanga---------------	4D	Slight	Slight	Moderate	Moderate	Severe	Black cherry--------	---	---	Black walnut, eastern white pine, white ash
							Black walnut--------	---	---	
							Northern red oak----	70	57	
							Sugar maple---------	---	---	
							Tuliptree-----------	---	---	
							White ash-----------	---	---	
							White oak-----------	---	---	
MxB:										
Mitiwanga---------------	4D	Slight	Slight	Moderate	Moderate	Severe	Black cherry--------	---	---	Black walnut, eastern white pine, white ash
							Black walnut--------	---	---	
							Northern red oak----	70	57	
							Sugar maple---------	---	---	
							Tuliptree-----------	---	---	
							White ash-----------	---	---	
							White oak-----------	---	---	
NoA:										
Nolin-------------------	8A	Slight	Slight	Slight	Slight	Severe	American sycamore---	---	---	Black walnut, cherrybark oak, eastern cottonwood, eastern white pine, sweetgum, tuliptree, white ash
							Black walnut--------	---	---	
							Cherrybark oak------	97	143	
							Eastern cottonwood--	---	---	
							River birch---------	---	---	
							Sweetgum------------	92	114	
							Tuliptree-----------	107	114	
OaB:										
Oakville----------------	4S	Slight	Moderate	Moderate	Slight	Moderate	Eastern white pine--	85	200	Eastern white pine
							Red pine------------	78	143	
							White oak-----------	70	72	
OgA:										
Ogontz------------------	5A	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	American sycamore, black cherry, black locust, eastern cottonwood, green ash, northern red oak, tuliptree, white ash, white oak
							Northern red oak----	86	72	
							Sugar maple---------	---	---	
							Tuliptree-----------	96	100	
							White ash-----------	---	---	
							White oak-----------	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
OhB:										
Ogontz	5A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	American sycamore, black cherry, black locust, eastern cottonwood, green ash, northern red oak, tuliptree, white ash, white oak
							Northern red oak	86	72	
							Sugar maple	---	---	
							Tuliptree	96	100	
							White ash	---	---	
							White oak	---	---	
OmA:										
Olmstead	5W	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Northern red oak	80	57	
							Pin oak	86	72	
							Red maple	---	---	
							Swamp white oak	80	57	
OpA:										
Orrville	5A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	Eastern white pine, green ash, northern red oak, tuliptree, white ash, white oak
							Northern red oak	80	57	
							Pin oak	85	72	
							Sugar maple	80	57	
							Tuliptree	90	86	
							White ash	---	---	
							White oak	---	---	
OrA:										
Orrville	5A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	Eastern white pine, green ash, northern red oak, tuliptree, white ash, white oak
							Northern red oak	80	57	
							Pin oak	85	72	
							Sugar maple	80	57	
							Tuliptree	90	86	
							White ash	---	---	
							White oak	---	---	
OsB:										
Oshtemo	4A	Slight	Slight	Moderate	Slight	Severe	American basswood	---	---	Black walnut, eastern white pine
							Northern red oak	70	57	
							Sugar maple	---	---	
							White oak	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
PcA:										
Pewamo	5W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	98	129	Eastern white pine, green ash, red maple, white ash
							Green ash	---	---	
							Pin oak	90	72	
							Red maple	71	43	
							Swamp white oak	---	---	
							White ash	71	72	
RaA:										
Randolph	4D	Slight	Slight	Moderate	Moderate	Severe	Northern red oak	75	57	Eastern white pine, tuliptree
							Sugar maple	90	57	
							Tuliptree	85	86	
RcA:										
Rawson	4A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	American sycamore, black cherry, black locust, eastern white pine, green ash, northern red oak, tuliptree, white ash, white oak
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	75	57	
RcB:										
Rawson	4A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	American sycamore, black cherry, black locust, eastern white pine, green ash, northern red oak, tuliptree, white ash, white oak
							Northern red oak	80	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	75	57	
RgA:										
Rimer	4A	Slight	Slight	Moderate	Slight	Moderate	Black oak	---	---	Black oak, northern red oak, white ash
							Bur oak	---	---	
							Green ash	---	---	
							Northern red oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White oak	75	57	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
RhA:										
Ritchey-----------------	2D	Slight	Slight	Moderate	Severe	Moderate	Bur oak-------------	---	---	Eastern redcedar, white oak
							Eastern redcedar----	---	---	
							Northern red oak----	50	29	
							White oak-----------	50	29	
RhB:										
Ritchey-----------------	2D	Slight	Slight	Moderate	Severe	Moderate	Bur oak-------------	---	---	Eastern redcedar, white oak
							Eastern redcedar----	---	---	
							Northern red oak----	50	29	
							White oak-----------	50	29	
RhC:										
Ritchey-----------------	2D	Slight	Slight	Moderate	Severe	Moderate	Bur oak-------------	---	---	Eastern redcedar, white oak
							Eastern redcedar----	---	---	
							Northern red oak----	50	29	
							White oak-----------	50	29	
SaA:										
Sandusky----------------	3W	Slight	Severe	Severe	Moderate	Severe	American sycamore---	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, red maple, swamp white oak, sweetgum
							Black willow--------	---	---	
							Eastern cottonwood--	80	86	
							Green ash-----------	---	---	
							Red maple-----------	74	43	
							Swamp white oak-----	64	43	
SbF:										
Saylesville-------------	4R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak----	75	57	Black walnut, eastern white pine, tuliptree
							Sugar maple---------	---	---	
							White oak-----------	---	---	
ShB:										
Shinrock----------------	4C	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	American sycamore, black oak, eastern cottonwood, green ash, pin oak, red maple, tuliptree
							Northern red oak----	80	57	
							Red maple-----------	---	---	
							Slippery elm--------	---	---	
							White ash-----------	---	---	
							White oak-----------	---	---	
SkC2:										
Shinrock----------------	4C	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	American sycamore, black oak, eastern cottonwood, green ash, pin oak, red maple, tuliptree
							Northern red oak----	80	57	
							Red maple-----------	---	---	
							Slippery elm--------	---	---	
							White ash-----------	---	---	
							White oak-----------	---	---	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Trees to manage
									cu ft/ac	
SkD2:										
Shinrock	4R	Moderate	Moderate	Slight	Slight	Severe	Black cherry	---	---	American sycamore, black oak, eastern cottonwood, green ash, pin oak, red maple, tuliptree
							Northern red oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
SpB:										
Spinks	4A	Slight	Slight	Moderate	Slight	Moderate	Northern red oak	70	57	Eastern white pine
							White oak	---	---	
SpD:										
Spinks	4R	Slight	Moderate	Moderate	Slight	Moderate	Northern red oak	70	57	Eastern white pine
							White oak	---	---	
TgA:										
Tioga	4A	Slight	Slight	Slight	Slight	Severe	Northern red oak	75	57	Black walnut, eastern white pine, tuliptree
							Sugar maple	67	43	
							Tuliptree	85	86	
TnA:										
Toledo	4W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Green ash	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Swamp white oak	80	57	
ToA:										
Toledo	4W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum
							Green ash	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Swamp white oak	80	57	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordi- nation symbol	Management concerns: Erosion hazard	Management concerns: Equip- ment limita- tion	Management concerns: Seedling mortal- ity	Management concerns: Wind- throw hazard	Management concerns: Plant competi- tion	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
TuA:										
Tuscola	5A	Slight	Slight	Slight	Slight	Severe	American basswood	---	---	Austrian pine, black walnut, eastern white pine, northern red oak, white ash
							Black walnut	---	---	
							Northern red oak	86	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
TuB:										
Tuscola	5A	Slight	Slight	Slight	Slight	Severe	American basswood	---	---	Austrian pine, black walnut, eastern white pine, northern red oak, white ash
							Black walnut	---	---	
							Northern red oak	86	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
UcB:										
Udipsamments.										
Spinks	4A	Slight	Slight	Moderate	Slight	Moderate	Northern red oak	70	57	Eastern white pine
							White oak	---	---	
WaB:										
Wakeman	4A	Slight	Slight	Slight	Moderate	Moderate	Northern red oak	70	57	Eastern white pine, northern red oak, sugar maple, white ash
							Sugar maple	73	43	
							White ash	75	43	
WaC:										
Wakeman	4A	Slight	Slight	Slight	Moderate	Moderate	Northern red oak	70	57	Eastern white pine, northern red oak, sugar maple, white ash
							Sugar maple	73	43	
							White ash	75	43	
WeA:										
Weyers	3W	Slight	Severe	Severe	Moderate	Severe	American sycamore	---	---	American sycamore, baldcypress, eastern cottonwood, green ash, red maple, swamp white oak, sweetgum
							Black willow	---	---	
							Eastern cottonwood	80	86	
							Green ash	---	---	
							Red maple	74	43	
							Swamp white oak	64	43	

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume of wood fiber	Trees to manage
									cu ft/ac	
ZuC2:										
Zurich	4A	Slight	Slight	Slight	Slight	Severe	Northern red oak	80	57	Black walnut, eastern white pine, green ash, northern red oak, white oak
							White oak	80	57	
ZuD2:										
Zurich	4R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	80	57	Black walnut, eastern white pine, green ash, northern red oak, white oak
							White oak	80	57	
ZuE2:										
Zurich	4R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	80	57	Black walnut, eastern white pine, green ash, northern red oak, white oak
							White oak	80	57	
ZuF:										
Zurich	4R	Moderate	Moderate	Slight	Slight	Severe	Northern red oak	80	57	Black walnut, eastern white pine, green ash, northern red oak, white oak
							White oak	80	57	

Table 11.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
AeA:					
Algiers	---	Silky dogwood, American cranberrybush	Norway spruce, Washington hawthorn, Austrian pine, northern white-cedar, white fir	---	Pin oak, eastern white pine
AkA:					
Allis	---	Silky dogwood, American cranberrybush	Norway spruce, Washington hawthorn, white fir, Austrian pine, eastern white pine, northern white-cedar	---	Eastern white pine, pin oak
AmD2:					
Amanda	---	Silky dogwood, American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
AnG:					
Amanda	---	Silky dogwood, American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
Dekalb	Siberian peashrub	Washington hawthorn, eastern redcedar, Japanese tree lilac, radiant crabapple	Austrian pine, red pine, eastern white pine	---	---
Rock outcrop.					
BdB:					
Belmore	Siberian peashrub	Washington hawthorn, radiant crabapple, Japanese tree lilac	Austrian pine, eastern redcedar	Eastern white pine	---
BeA:					
Bennington	---	American cranberrybush, arrowwood, Washington hawthorn	Osageorange, Austrian pine, eastern redcedar, green ash	Pin oak, eastern white pine	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BgA: Bennington	---	American cranberrybush, arrowwood, Washington hawthorn	Osageorange, Austrian pine, eastern redcedar, green ash	Pin oak, eastern white pine	---
BgB: Bennington	---	American cranberrybush, arrowwood, Washington hawthorn	Osageorange, Austrian pine, eastern redcedar, green ash	Pin oak, eastern white pine	---
BkA: Bixler	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
BkB: Bixler	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
BvG: Brecksville	Siberian peashrub	Japanese tree lilac, eastern redcedar, Washington hawthorn, radiant crabapple	Red pine	Austrian pine, eastern white pine	---
CaA: Cardington	---	Silky dogwood, American cranberrybush	Austrian pine, northern white-cedar, Washington hawthorn	Norway spruce	Pin oak, eastern white pine
CaB: Cardington	---	Silky dogwood, American cranberrybush	Northern white-cedar, Washington hawthorn, Austrian pine	Norway spruce	Pin oak, eastern white pine
CbC2: Cardington	---	Silky dogwood, American cranberrybush	Northern white-cedar, Austrian pine, Washington hawthorn	Norway spruce	Pin oak, eastern white pine

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
ChB:					
Chili	Siberian peashrub	Japanese tree lilac, radiant crabapple, Washington hawthorn, eastern redcedar	Red pine, Austrian pine, eastern white pine	---	---
CmA:					
Colwood	---	Silky dogwood, American cranberrybush	Northern white-cedar, Austrian pine, Washington hawthorn, Norway spruce, white fir	Eastern white pine	Pin oak
CnA:					
Colwood	---	Silky dogwood, American cranberrybush	Northern white-cedar, Austrian pine, Washington hawthorn, Norway spruce, white fir	Eastern white pine	Pin oak
CoA:					
Condit	---	American cranberrybush, silky dogwood	Norway spruce, Washington hawthorn, northern white-cedar, Austrian pine, white fir	Eastern white pine	Pin oak
CtB:					
Conotton	Siberian peashrub	Japanese tree lilac, radiant crabapple, Washington hawthorn, eastern redcedar	Red pine, Austrian pine, eastern white pine	---	---
CuC:					
Conotton	Siberian peashrub	Japanese tree lilac, Washington hawthorn, eastern redcedar, radiant crabapple	Red pine, Austrian pine, eastern white pine	---	---
DbB:					
Dekalb	Siberian peashrub	Japanese tree lilac, Washington hawthorn, eastern redcedar, radiant crabapple	Red pine, Austrian pine, eastern white pine	---	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
DbD: Dekalb	Siberian peashrub	Washington hawthorn, eastern redcedar, Japanese tree lilac, radiant crabapple	Red pine, Austrian pine, eastern white pine	---	---
DeA: Del Rey	---	American cranberrybush, arrowwood, eastern redcedar, Washington hawthorn	Osageorange, green ash, Austrian pine	Pin oak	---
DuA: Dunbridge	Siberian peashrub	Japanese tree lilac, radiant crabapple, Washington hawthorn, eastern redcedar	Eastern white pine, red pine, Austrian pine	---	---
DuB: Dunbridge	Siberian peashrub	Washington hawthorn, radiant crabapple, Japanese tree lilac, eastern redcedar	Red pine, Austrian pine, eastern white pine	---	---
EdB: Ellsworth	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak	---
EdC2: Ellsworth	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak	---
EnA: Elnora	---	American cranberrybush, silky dogwood	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
EoA: Elnora	---	Silky dogwood, American cranberrybush	Northern white-cedar, Washington hawthorn, Austrian pine	Norway spruce	Pin oak, eastern white pine
FoB: Fox	Siberian peashrub	Eastern redcedar, radiant crabapple	Eastern white pine, Austrian pine, Washington hawthorn, red pine	---	---
FrA: Fries	---	Eastern redcedar, silky dogwood, American cranberrybush	White fir, Austrian pine, Washington hawthorn, Norway spruce, northern white-cedar	Eastern white pine	Pin oak
FuA: Fulton	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak	---
GdA: Gilford	---	Silky dogwood, American cranberrybush	Northern white-cedar, Austrian pine, Washington hawthorn, Norway spruce, white fir	Eastern white pine	Pin oak
HdA: Harrod	---	American cranberrybush, silky dogwood	Northern white-cedar, Austrian pine, Washington hawthorn	Eastern white pine	Pin oak
HkA: Haskins	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HoA:					
Holly	---	Silky dogwood, American cranberrybush	White fir, Austrian pine, Washington hawthorn, Norway spruce, northern white-cedar	Eastern white pine	Pin oak
HpB:					
Hornell	---	American cranberrybush, arrowwood, eastern redcedar, Washington hawthorn	Osageorange, common hackberry, Austrian pine	Pin oak	---
HrB:					
Hornell	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Austrian pine, osageorange, common hackberry	Pin oak	---
HsA:					
Hornell	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, common hackberry, Austrian pine	Pin oak	---
JtA:					
Jimtown	---	American cranberrybush, silky dogwood	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
KbA:					
Kibbie	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
MaA:					
Mahoning	---	American cranberrybush, arrowwood, eastern redcedar, Washington hawthorn	Osageorange, green ash, Austrian pine	Pin oak	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
MaB: Mahoning	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak	---
MeA: Mermill	---	Silky dogwood, American cranberrybush	Austrian pine, Washington hawthorn, northern white-cedar, Norway spruce, white fir	Eastern white pine	Pin oak
MfA: Milford	---	Silky dogwood, American cranberrybush	Washington hawthorn, Norway spruce, northern white-cedar, Austrian pine, white fir	Eastern white pine	Pin oak
MgA: Millgrove	---	Silky dogwood, American cranberrybush	White fir, Austrian pine, Washington hawthorn, Norway spruce, northern white-cedar	Eastern white pine	Pin oak
MmA: Millsdale	---	Silky dogwood, American cranberrybush	White fir, Austrian pine, Washington hawthorn, Norway spruce, northern white-cedar	Eastern white pine	---
MnA: Milton	Siberian peashrub	Japanese tree lilac, eastern redcedar, Washington hawthorn, radiant crabapple	Eastern white pine, Austrian pine	---	---
MnB: Milton	Siberian peashrub	Japanese tree lilac, eastern redcedar, Washington hawthorn, radiant crabapple	Eastern white pine, Austrian pine	---	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
MrA:					
Miner	---	Silky dogwood, American cranberrybush	White fir, Austrian pine, Washington hawthorn, Norway spruce, northern white-cedar	Eastern white pine	Pin oak
MsA:					
Miner	---	Silky dogwood, American cranberrybush	White fir, Austrian pine, Washington hawthorn, blue spruce, Norway spruce, northern white-cedar	Eastern white pine	Pin oak
MxA:					
Mitiwanga	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
MxB:					
Mitiwanga	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
NoA:					
Nolin	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, white fir, Austrian pine, blue spruce	Norway spruce	Pin oak, eastern white pine
OaB:					
Oakville	Siberian peashrub	Japanese tree lilac, radiant crabapple, Washington hawthorn, eastern redcedar	Red pine, Austrian pine	Eastern white pine	---
OgA:					
Ogontz	---	Silky dogwood, American cranberrybush	Blue spruce, Austrian pine, Washington hawthorn, northern white-cedar, white fir	Norway spruce	Pin oak, eastern white pine

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
OhB:					
Ogontz	---	Silky dogwood, American cranberrybush	Blue spruce, Austrian pine, Washington hawthorn, northern white-cedar, white fir	Norway spruce	Pin oak, eastern white pine
OmA:					
Olmstead	---	Silky dogwood, American cranberrybush	Blue spruce, white fir, Austrian pine, Washington hawthorn, Norway spruce, northern white-cedar	Eastern white pine	Pin oak
OpA:					
Orrville	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
OrA:					
Orrville	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
OsB:					
Oshtemo	Siberian peashrub	Japanese tree lilac, nannyberry, Roselow sargent crabapple, silky dogwood	Green ash, eastern redcedar, red pine	Norway spruce, eastern white pine	---
PcA:					
Pewamo	---	Silky dogwood, American cranberrybush	Austrian pine, Washington hawthorn, northern white-cedar, Norway spruce, white fir	Eastern white pine	Pin oak
PmA:					
Plumbrook	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
RaA:					
Randolph	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
RcA:					
Rawson	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
RcB:					
Rawson	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
RgA:					
Rimer	---	Silky dogwood, American cranberrybush	Washington hawthorn, northern white-cedar, Austrian pine	Norway spruce	Pin oak, eastern white pine
RhA:					
Ritchey	Siberian peashrub	Japanese tree lilac, eastern redcedar, Washington hawthorn, radiant crabapple	Eastern white pine, Austrian pine	---	---
RhB:					
Ritchey	Siberian peashrub	Japanese tree lilac, eastern redcedar, Washington hawthorn, radiant crabapple	Eastern white pine, Austrian pine	---	---
RhC:					
Ritchey	Siberian peashrub	Japanese tree lilac, eastern redcedar, Washington hawthorn, radiant crabapple	Eastern white pine, Austrian pine	---	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
SaA:					
Sandusky	---	Nannyberry, Washington hawthorn	Eastern redcedar, osageorange, white spruce, green ash, northern white-cedar	Black willow	---
SbF:					
Saylesville	---	Silky dogwood, American cranberrybush	Northern white-cedar, blue spruce, Washington hawthorn, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
ShB:					
Shinrock	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak, eastern white pine	---
SkC2:					
Shinrock	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak, eastern white pine	---
SkD2:					
Shinrock	---	American cranberrybush, arrowwood, Washington hawthorn, eastern redcedar	Osageorange, green ash, Austrian pine	Pin oak, eastern white pine	---
SpB:					
Spinks	---	American cranberrybush, Washington hawthorn	Eastern redcedar, Austrian pine, northern white-cedar, osageorange	Eastern white pine, Norway spruce	---
SpD:					
Spinks	---	Washington hawthorn, American cranberrybush	Eastern redcedar, Austrian pine, northern white-cedar, osageorange	Eastern white pine, Norway spruce	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
TgA: Tioga	---	Silky dogwood, American cranberrybush	Northern white-cedar, Austrian pine, Washington hawthorn, white fir	Norway spruce	Pin oak, eastern white pine
TnA: Toledo	---	Silky dogwood, American cranberrybush	Austrian pine, Washington hawthorn, northern white-cedar, Norway spruce, white fir	---	Pin oak
ToA: Toledo	---	Silky dogwood, American cranberrybush	Austrian pine, northern white-cedar, white fir, Norway spruce, Washington hawthorn	---	Pin oak
TuA: Tuscola	---	American cranberrybush, Washington hawthorn	Osageorange, eastern redcedar, Austrian pine, northern white-cedar	Norway spruce, eastern white pine	---
TuB: Tuscola	---	American cranberrybush, Washington hawthorn	Northern white-cedar, eastern redcedar, Austrian pine, osageorange	Norway spruce, eastern white pine	---
UcB: Udipsamments.					
Spinks	---	Washington hawthorn, American cranberrybush	Eastern redcedar, Austrian pine, northern white-cedar, osageorange	Eastern white pine, Norway spruce	---
WaB: Wakeman	Siberian peashrub	Japanese tree lilac, Washington hawthorn, eastern redcedar, radiant crabapple	Austrian pine	Eastern white pine	---

Table 11.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
WaC:					
Wakeman	Siberian peashrub	Japanese tree lilac, Washington hawthorn, eastern redcedar, radiant crabapple	Austrian pine	Eastern white pine	---
WeA:					
Weyers	---	Washington hawthorn, eastern redcedar, nannyberry	White spruce, northern white-cedar, osageorange	Green ash, black willow	---
ZuC2:					
Zurich	---	Silky dogwood, American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
ZuD2:					
Zurich	---	Silky dogwood, American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
ZuE2:					
Zurich	---	Silky dogwood, American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine
ZuF:					
Zurich	---	Silky dogwood, American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar, white fir	Austrian pine, Norway spruce	Pin oak, eastern white pine

Table 12.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaA:					
Adrian	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding	Severe: excess humus ponding
AeA:					
Algiers	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
AkA:					
Allis	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness	Severe: wetness
AmD2:					
Amanda	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
AnG:					
Amanda	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope
Dekalb	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope small stones
Rock outcrop.					
BdB:					
Belmore	Slight	Slight	Moderate: slope small stones	Slight	Slight
BeA:					
Bennington	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
BgA:					
Bennington	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
BgB:					
Bennington	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
BkA:					
Bixler	Moderate: too sandy	Moderate: too sandy wetness	Moderate: too sandy wetness	Moderate: too sandy wetness	Moderate: droughty
BkB:					
Bixler	Moderate: too sandy	Moderate: too sandy wetness	Moderate: slope too sandy wetness	Moderate: too sandy wetness	Moderate: droughty

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BvG:					
Brecksville	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope
CaA:					
Cardington	Moderate: percs slowly wetness	Moderate: percs slowly wetness	Moderate: percs slowly wetness	Moderate: wetness	Moderate: wetness
CaB:					
Cardington	Moderate: percs slowly wetness	Moderate: percs slowly wetness	Moderate: percs slowly slope wetness	Moderate: wetness	Moderate: wetness
CbC2:					
Cardington	Moderate: percs slowly slope wetness	Moderate: percs slowly slope wetness	Severe: slope	Severe: erodes easily	Moderate: slope wetness
CcA:					
Castalia	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones	Severe: large stones
CcB:					
Castalia	Severe: small stones	Severe: small stones	Severe: small stones	Severe: small stones	Severe: large stones
CcD:					
Castalia	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: small stones	Severe: large stones slope
ChB:					
Chili	Slight	Slight	Moderate: slope small stones	Slight	Moderate: droughty
CmA:					
Colwood	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
CnA:					
Colwood	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
CoA:					
Condit	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
CtB:					
Conotton	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight	Moderate: small stones droughty
CuC:					
Conotton	Severe: small stones	Severe: small stones	Severe: slope small stones	Slight	Severe: small stones
DbB:					
Dekalb	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: large stones	Severe: small stones

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DbD:					
Dekalb	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: large stones slope	Severe: slope small stones
DeA:					
Del Rey	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
DuA:					
Dunbridge	Slight	Slight	Moderate: small stones	Slight	Moderate: depth to rock
DuB:					
Dunbridge	Slight	Slight	Moderate: slope small stones	Slight	Moderate: depth to rock
EcA:					
Elliott	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
EdB:					
Ellsworth	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Moderate: wetness	Moderate: wetness
EdC2:					
Ellsworth	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly slope	Severe: erodes easily	Moderate: slope wetness
EnA:					
Elnora	Moderate: too sandy wetness	Moderate: too sandy wetness	Moderate: slope too sandy wetness	Moderate: too sandy wetness	Moderate: wetness droughty
EoA:					
Elnora	Moderate: too sandy wetness	Moderate: too sandy wetness	Moderate: slope too sandy wetness	Moderate: too sandy wetness	Moderate: wetness droughty
EsA:					
Endoaquents	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
FnA:					
Fluvaquents	Severe: flooding ponding	Severe: ponding	Severe: flooding ponding	Severe: ponding	Severe: flooding ponding
FoB:					
Fox	Slight	Slight	Moderate: slope	Slight	Slight
FrA:					
Fries	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
FuA:					
Fulton	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GdA:					
Gilford	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
HdA:					
Harrod	Severe: flooding	Moderate: flooding wetness	Severe: flooding	Moderate: flooding wetness	Severe: flooding
HkA:					
Haskins	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly wetness	Moderate: wetness	Moderate: wetness
HoA:					
Holly	Severe: flooding wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: flooding wetness
HpB:					
Hornell	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
HrB:					
Hornell	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
HsA:					
Hornell	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
JtA:					
Jimtown	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
JuA:					
Joliet	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness	Severe: wetness depth to rock
KbA:					
Kibbie	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
MaA:					
Mahoning	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
MaB:					
Mahoning	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: percs slowly wetness	Severe: wetness	Severe: wetness
MbB:					
Marblehead	Severe: depth to rock	Severe: depth to rock	Severe: small stones depth to rock	Slight	Severe: depth to rock

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MeA:					
Mermill	Severe: percs slowly ponding	Severe: percs slowly ponding	Severe: percs slowly ponding	Severe: ponding	Severe: ponding
MfA:					
Milford	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
MgA:					
Millgrove	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
MmA:					
Millsdale	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
MnA:					
Milton	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly	Slight	Moderate: depth to rock
MnB:					
Milton	Moderate: percs slowly	Moderate: percs slowly	Moderate: percs slowly slope depth to rock	Slight	Moderate: depth to rock
MrA:					
Miner	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
MsA:					
Miner	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
MxA:					
Mitiwanga	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
MxB:					
Mitiwanga	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
NoA:					
Nolin	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
OaB:					
Oakville	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty
OgA:					
Ogontz	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
OhB:					
Ogontz	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Moderate: wetness	Moderate: wetness
OmA:					
Olmstead	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
OpA: Orrville	Severe: flooding wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: flooding wetness
OrA: Orrville	Severe: flooding wetness	Moderate: flooding wetness	Severe: flooding wetness	Moderate: flooding wetness	Severe: flooding
OsB: Oshtemo	Slight	Slight	Moderate: slope small stones	Slight	Slight
PcA: Pewamo	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
PmA: Plumbrook	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
RaA: Randolph	Severe: wetness	Moderate: percs slowly wetness	Severe: wetness	Moderate: wetness	Moderate: wetness depth to rock
RcA: Rawson	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Slight	Slight
RcB: Rawson	Severe: percs slowly	Severe: percs slowly	Severe: percs slowly	Slight	Slight
RgA: Rimer	Severe: percs slowly wetness	Severe: percs slowly	Severe: percs slowly wetness	Moderate: too sandy wetness	Moderate: wetness droughty
RhA: Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
RhB: Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Slight	Severe: depth to rock
RhC: Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: erodes easily	Severe: depth to rock
SaA: Sandusky	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
SbF: Saylesville	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ShB:					
Shinrock	Moderate: percs slowly wetness	Moderate: percs slowly wetness	Moderate: percs slowly slope wetness	Moderate: wetness	Moderate: wetness
SkC2:					
Shinrock	Moderate: percs slowly slope wetness	Moderate: percs slowly slope wetness	Severe: slope	Severe: erodes easily	Moderate: slope
SkD2:					
Shinrock	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
SpB:					
Spinks	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty
SpD:					
Spinks	Severe: slope	Severe: slope	Severe: slope	Moderate: slope too sandy	Severe: slope
TgA:					
Tioga	Severe: flooding	Slight	Moderate: flooding	Slight	Moderate: flooding
TnA:					
Toledo	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding
ToA:					
Toledo	Severe: too clayey ponding	Severe: too clayey ponding	Severe: too clayey ponding	Severe: too clayey ponding	Severe: too clayey ponding
TpA:					
Toledo	Severe: too clayey ponding	Severe: too clayey ponding	Severe: too clayey ponding	Severe: too clayey ponding	Severe: too clayey ponding
TuA:					
Tuscola	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
TuB:					
Tuscola	Moderate: wetness	Moderate: wetness	Moderate: slope wetness	Moderate: wetness	Moderate: wetness
UcB:					
Udipsamments.					
Spinks	Moderate: too sandy	Moderate: too sandy	Moderate: slope too sandy	Moderate: too sandy	Moderate: droughty
WaB:					
Wakeman	Slight	Slight	Moderate: slope small stones depth to rock	Slight	Moderate: depth to rock

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WaC: Wakeman	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope depth to rock
WeA: Weyers	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
ZuC2: Zurich	Moderate: slope	Moderate: slope	Severe: slope	Severe: erodes easily	Moderate: slope
ZuD2: Zurich	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
ZuE2: Zurich	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily	Severe: slope
ZuF: Zurich	Severe: slope	Severe: slope	Severe: slope	Severe: erodes easily slope	Severe: slope

Table 13.--Wildlife Habitat

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaA:										
Adrian----------	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
AeA:										
Algiers---------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
AkA:										
Allis-----------	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair
AmD2:										
Amanda----------	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
AnG:										
Amanda----------	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
Dekalb----------	Very poor	Poor	Good	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor
Rock outcrop.										
BdB:										
Belmore---------	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
BeA:										
Bennington------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
BgA:										
Bennington------	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
BgB:										
Bennington------	Fair	Good	Good	Good	Good	Very poor	Fair	Good	Good	Very poor
BkA:										
Bixler----------	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair
BkB:										
Bixler----------	Poor	Fair	Good	Good	Good	Very poor	Fair	Fair	Good	Very poor
BvG:										
Brecksville-----	Very poor	Poor	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor
CaA:										
Cardington------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
CaB:										
Cardington------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CbC2:										
Cardington------	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
CcA:										
Castalia--------	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor

Table 13.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
CcB: Castalia	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor
CcD: Castalia	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Poor	Very poor	Very poor
ChB: Chili	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CmA: Colwood	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
CnA: Colwood	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good
CoA: Condit	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
CtB: Conotton	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
CuC: Conotton	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
DbB: Dekalb	Fair	Good	Good	Fair	Fair	Poor	Very poor	Good	Fair	Very poor
DbD: Dekalb	Poor	Fair	Good	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
DeA: Del Rey	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
DuA: Dunbridge	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
DuB: Dunbridge	Fair	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor
EcA: Elliott	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
EdB: Ellsworth	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
EdC2: Ellsworth	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
EnA: Elnora	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor

Table 13.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
EoA: Elnora	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor
EsA: Endoaquents	Very poor	Very poor	Poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
FnA: Fluvaquents	Very poor	Very poor	Poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
FoB: Fox	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
FrA: Fries	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
FuA: Fulton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
GdA: Gilford	Fair	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
HdA: Harrod	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Fair	Fair
HkA: Haskins	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
HoA: Holly	Fair	Fair	Poor	Fair	Fair	Good	Good	Fair	Fair	Good
HpB: Hornell	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Very poor
HrB: Hornell	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Very poor
HsA: Hornell	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
JtA: Jimtown	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
JuA: Joliet	Poor	Poor	Fair	Fair	Fair	Good	Poor	Poor	Fair	Fair
KbA: Kibbie	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
MaA: Mahoning	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
MaB: Mahoning	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
MbB: Marblehead	Very poor	Very poor	Poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor

Table 13.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MeA: Mermill	Good	Good	Good	Good	Fair	Good	Good	Fair	Good	Good
MfA: Milford	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
MgA: Millgrove	Fair	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
MmA: Millsdale	Fair	Fair	Fair	Fair	Poor	Good	Fair	Fair	Fair	Fair
MnA: Milton	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
MnB: Milton	Fair	Good	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
MrA: Miner	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
MsA: Miner	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
MxA: Mitiwanga	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
MxB: Mitiwanga	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
NoA: Nolin	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
OaB: Oakville	Poor	Fair	Fair	Good	Good	Poor	Very poor	Fair	Good	Very poor
OgA: Ogontz	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
OhB: Ogontz	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
OmA: Olmsted	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good
OpA: Orrville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
OrA: Orrville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
OsB: Oshtemo	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor

Table 13.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
PcA: Pewamo	Poor	Poor	Fair	Fair	Fair	Good	Good	Fair	Fair	Good
PmA: Plumbrook	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor
RaA: Randolph	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
RcA: Rawson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
RcB: Rawson	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
RgA: Rimer	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair
RhA: Ritchey	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
RhB: Ritchey	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
RhC: Ritchey	Poor	Poor	Fair	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor
SaA: Sandusky	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
SbF: Saylesville	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
ShB: Shinrock	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
SkC2: Shinrock	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
SkD2: Shinrock	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
SpB: Spinks	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
SpD: Spinks	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
TgA: Tioga	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor

Table 13.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
TnA:										
Toledo----------	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
ToA:										
Toledo----------	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
TpA:										
Toledo----------	Very poor	Poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good
TuA:										
Tuscola---------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
TuB:										
Tuscola---------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
UcB:										
Udipsamments.										
Spinks----------	Fair	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor
WaB:										
Wakeman---------	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
WaC:										
Wakeman---------	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
WeA:										
Weyers----------	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good
ZuC2:										
Zurich----------	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ZuD2:										
Zurich----------	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
ZuE2:										
Zurich----------	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
ZuF:										
Zurich----------	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor

Table 14.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaA:						
Adrian	Severe: excess humus ponding cutbanks cave	Severe: subsides ponding	Severe: subsides ponding	Severe: subsides ponding	Severe: frost action subsides ponding	Severe: excess humus ponding
AeA:						
Algiers	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness
AkA:						
Allis	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
AmD2:						
Amanda	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
AnG:						
Amanda	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
Dekalb	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope small stones
Rock outcrop.						
BdB:						
Belmore	Slight	Slight	Slight	Moderate: slope	Slight	Slight
BeA:						
Bennington	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness
BgA:						
Bennington	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BgB:						
Bennington	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness
BkA:						
Bixler	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Severe: frost action	Moderate: droughty
BkB:						
Bixler	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Severe: frost action	Moderate: droughty
BvG:						
Brecksville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
CaA:						
Cardington	Severe: wetness	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell wetness	Severe: frost action low strength	Moderate: wetness
CaB:						
Cardington	Severe: wetness	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell slope wetness	Severe: frost action low strength	Moderate: wetness
CbC2:						
Cardington	Severe: wetness	Moderate: shrink-swell slope wetness	Severe: wetness	Severe: slope	Severe: frost action low strength	Moderate: slope wetness
CcA:						
Castalia	Severe: large stones depth to rock	Severe: large stones	Severe: large stones depth to rock	Severe: large stones	Severe: large stones	Severe: large stones
CcB:						
Castalia	Severe: large stones depth to rock	Severe: large stones	Severe: large stones depth to rock	Severe: large stones	Severe: large stones	Severe: large stones

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CcD:						
Castalia	Severe: large stones slope depth to rock	Severe: large stones slope	Severe: large stones slope depth to rock	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope
ChB:						
Chili	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: droughty
CmA:						
Colwood	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding
CnA:						
Colwood	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding
CoA:						
Condit	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding
CtB:						
Conotton	Slight	Slight	Slight	Moderate: slope	Moderate: frost action	Moderate: small stones droughty
CuC:						
Conotton	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: frost action slope	Severe: small stones
DbB:						
Dekalb	Severe: depth to rock	Moderate: large stones depth to rock	Severe: depth to rock	Moderate: large stones slope depth to rock	Moderate: large stones depth to rock	Severe: small stones
DbD:						
Dekalb	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope	Severe: slope small stones

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DeA:						
Del Rey	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness
DuA:						
Dunbridge	Severe: depth to rock	Moderate: shrink-swell depth to rock	Severe: depth to rock	Moderate: shrink-swell depth to rock	Moderate: frost action shrink-swell depth to rock	Moderate: depth to rock
DuB:						
Dunbridge	Severe: depth to rock	Moderate: shrink-swell depth to rock	Severe: depth to rock	Moderate: shrink-swell slope depth to rock	Moderate: frost action shrink-swell depth to rock	Moderate: depth to rock
EcA:						
Elliott	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness
EdB:						
Ellsworth	Severe: wetness	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell slope wetness	Severe: frost action low strength	Moderate: wetness
EdC2:						
Ellsworth	Severe: wetness	Moderate: shrink-swell slope wetness	Severe: wetness	Severe: slope	Severe: frost action low strength	Moderate: slope wetness
EnA:						
Elnora	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: wetness droughty
EoA:						
Elnora	Severe: wetness cutbanks cave	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Moderate: wetness droughty
EsA:						
Endoaquents	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FnA:						
Fluvaquents	Severe: ponding	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding ponding
FoB:						
Fox	Severe: cutbanks cave	Moderate: shrink-swell	Slight	Moderate: shrink-swell slope	Moderate: frost action shrink-swell	Slight
FrA:						
Fries	Severe: ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: low strength shrink-swell ponding	Severe: ponding
FuA:						
Fulton	Severe: wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: shrink-swell wetness	Severe: low strength shrink-swell	Moderate: wetness
GdA:						
Gilford	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: ponding
HdA:						
Harrod	Severe: wetness depth to rock	Severe: flooding	Severe: flooding wetness depth to rock	Severe: flooding	Severe: flooding frost action	Severe: flooding
HkA:						
Haskins	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: wetness
HoA:						
Holly	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding frost action wetness	Severe: flooding wetness
HpB:						
Hornell	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: low strength wetness	Severe: wetness

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HrB:						
Hornell	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: low strength wetness	Severe: wetness
HsA:						
Hornell	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: low strength wetness	Severe: wetness
JtA:						
Jimtown	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: wetness
JuA:						
Joliet	Severe: wetness depth to rock	Severe: flooding low strength wetness	Severe: flooding wetness depth to rock	Severe: flooding low strength wetness	Severe: wetness depth to rock	Severe: wetness depth to rock
KbA:						
Kibbie	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength	Moderate: wetness
MaA:						
Mahoning	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength wetness	Severe: wetness
MaB:						
Mahoning	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action low strength wetness	Severe: wetness
MbB:						
Marblehead	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock
MeA:						
Mermill	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: ponding

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MfA:						
Milford	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding
MgA:						
Millgrove	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: ponding
MmA:						
Millsdale	Severe: ponding depth to rock	Severe: shrink-swell ponding	Severe: shrink-swell ponding depth to rock	Severe: shrink-swell ponding	Severe: low strength shrink-swell ponding	Severe: ponding
MnA:						
Milton	Severe: depth to rock	Moderate: shrink-swell depth to rock	Severe: depth to rock	Moderate: shrink-swell depth to rock	Severe: low strength	Moderate: depth to rock
MnB:						
Milton	Severe: depth to rock	Moderate: shrink-swell depth to rock	Severe: depth to rock	Moderate: shrink-swell slope depth to rock	Severe: low strength	Moderate: depth to rock
MrA:						
Miner	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding
MsA:						
Miner	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding
MxA:						
Mitiwanga	Severe: wetness depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action	Moderate: wetness

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MxB:						
Mitiwanga	Severe: wetness depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action	Moderate: wetness
NoA:						
Nolin	Moderate: flooding wetness	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding low strength	Moderate: flooding
OaB:						
Oakville	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
OgA:						
Ogontz	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Severe: frost action	Moderate: wetness
OhB:						
Ogontz	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Severe: frost action	Moderate: wetness
OmA:						
Olmstead	Severe: ponding cutbanks cave	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action ponding	Severe: ponding
OpA:						
Orrville	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding frost action	Moderate: flooding wetness
OrA:						
Orrville	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding frost action	Severe: flooding
OsB:						
Oshtemo	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Moderate: frost action	Slight
PcA:						
Pewamo	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: frost action low strength ponding	Severe: ponding

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PmA:						
Plumbrook	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: wetness
RaA:						
Randolph	Severe: wetness depth to rock	Severe: wetness	Severe: wetness depth to rock	Severe: wetness	Severe: frost action low strength	Moderate: wetness depth to rock
RcA:						
Rawson	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: wetness	Moderate: frost action wetness	Slight
RcB:						
Rawson	Severe: wetness	Moderate: wetness	Severe: wetness	Moderate: slope wetness	Moderate: frost action wetness	Slight
RgA:						
Rimer	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action	Moderate: wetness droughty
RhA:						
Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock
RhB:						
Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock
RhC:						
Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock
SaA:						
Sandusky	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
SbF:						
Saylesville	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ShB:						
Shinrock----------------	Severe: wetness cutbanks cave	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell slope wetness	Severe: frost action low strength	Moderate: wetness
SkC2:						
Shinrock----------------	Severe: wetness cutbanks cave	Moderate: shrink-swell slope wetness	Severe: wetness	Severe: slope	Severe: frost action low strength	Moderate: slope
SkD2:						
Shinrock----------------	Severe: slope wetness cutbanks cave	Severe: slope	Severe: slope wetness	Severe: slope	Severe: frost action low strength slope	Severe: slope
SpB:						
Spinks------------------	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
SpD:						
Spinks------------------	Severe: slope cutbanks cave	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
TgA:						
Tioga-------------------	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
TnA:						
Toledo------------------	Severe: ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: frost action low strength ponding	Severe: ponding
ToA:						
Toledo------------------	Severe: ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: frost action low strength ponding	Severe: too clayey ponding
TpA:						
Toledo------------------	Severe: ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: shrink-swell ponding	Severe: frost action low strength ponding	Severe: too clayey ponding

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TuA:						
Tuscola	Severe: wetness cutbanks cave	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell wetness	Severe: frost action	Moderate: wetness
TuB:						
Tuscola	Severe: wetness cutbanks cave	Moderate: shrink-swell wetness	Severe: wetness	Moderate: shrink-swell slope wetness	Severe: frost action	Moderate: wetness
UcB:						
Udipsamments.						
Spinks	Severe: cutbanks cave	Slight	Slight	Moderate: slope	Slight	Moderate: droughty
WaB:						
Wakeman	Severe: cutbanks cave depth to rock	Moderate: depth to rock	Severe: depth to rock	Moderate: slope depth to rock	Moderate: frost action depth to rock	Moderate: depth to rock
WaC:						
Wakeman	Severe: cutbanks cave depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: frost action slope depth to rock	Moderate: slope depth to rock
WeA:						
Weyers	Severe: wetness cutbanks cave	Severe: wetness	Severe: wetness	Severe: wetness	Severe: frost action wetness	Severe: wetness
ZuC2:						
Zurich	Severe: cutbanks cave	Moderate: shrink-swell slope	Severe: wetness	Severe: slope	Severe: frost action low strength	Moderate: slope
ZuD2:						
Zurich	Severe: slope cutbanks cave	Severe: slope	Severe: slope wetness	Severe: slope	Severe: frost action low strength slope	Severe: slope

Table 14.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ZuE2:						
Zurich------------------	Severe: slope cutbanks cave	Severe: slope	Severe: slope wetness	Severe: slope	Severe: frost action low strength slope	Severe: slope
ZuF:						
Zurich------------------	Severe: slope cutbanks cave	Severe: slope	Severe: slope wetness	Severe: slope	Severe: frost action low strength slope	Severe: slope

Table 15.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA:					
Adrian	Severe: percs slowly subsides ponding	Severe: excess humus seepage ponding	Severe: seepage too sandy ponding	Severe: seepage ponding	Poor: seepage too sandy ponding
AeA:					
Algiers	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Poor: wetness
AkA:					
Allis	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: too clayey wetness depth to rock	Severe: wetness depth to rock	Poor: small stones too clayey depth to rock
AmD2:					
Amanda	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
AnG:					
Amanda	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Dekalb	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
Rock outcrop.					
BdB:					
Belmore	Severe: poor filter	Severe: seepage	Severe: seepage	Severe: seepage	Good
BeA:					
Bennington	Severe: percs slowly wetness	Slight	Severe: wetness	Severe: wetness	Poor: wetness
BgA:					
Bennington	Severe: percs slowly wetness	Slight	Severe: wetness	Severe: wetness	Poor: wetness
BgB:					
Bennington	Severe: percs slowly wetness	Moderate: slope	Severe: wetness	Severe: wetness	Poor: wetness
BkA:					
Bixler	Severe: wetness	Severe: seepage wetness	Severe: wetness	Severe: seepage wetness	Poor: too sandy

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BkB:					
Bixler	Severe: wetness	Severe: seepage wetness	Severe: wetness	Severe: seepage wetness	Poor: too sandy
BvG:					
Brecksville	Severe: percs slowly slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
CaA:					
Cardington	Severe: percs slowly wetness	Slight	Severe: wetness	Moderate: wetness	Fair: too clayey wetness
CaB:					
Cardington	Severe: percs slowly wetness	Moderate: slope	Severe: wetness	Moderate: wetness	Fair: too clayey wetness
CbC2:					
Cardington	Severe: percs slowly wetness	Severe: slope	Severe: wetness	Moderate: slope wetness	Fair: slope too clayey wetness
CcA:					
Castalia	Severe: large stones poor filter depth to rock	Severe: large stones seepage depth to rock	Severe: large stones seepage depth to rock	Severe: seepage depth to rock	Poor: large stones thin layer depth to rock
CcB:					
Castalia	Severe: large stones poor filter depth to rock	Severe: large stones seepage depth to rock	Severe: large stones seepage depth to rock	Severe: seepage depth to rock	Poor: large stones thin layer depth to rock
CcD:					
Castalia	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: large stones slope depth to rock
ChB:					
Chili	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Fair: small stones
CmA:					
Colwood	Severe: percs slowly ponding	Severe: ponding	Severe: ponding	Severe: ponding	Poor: ponding
CnA:					
Colwood	Severe: percs slowly ponding	Severe: ponding	Severe: ponding depth to rock	Severe: ponding	Poor: ponding
CoA:					
Condit	Severe: percs slowly wetness	Severe: ponding	Severe: ponding	Severe: ponding	Poor: ponding

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CtB:					
Conotton	Severe: poor filter	Severe: seepage	Severe: seepage	Severe: seepage	Poor: small stones
CuC:					
Conotton	Severe: poor filter	Severe: seepage slope	Severe: seepage	Severe: seepage	Poor: small stones
DbB:					
Dekalb	Severe: poor filter depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: small stones depth to rock
DbD:					
Dekalb	Severe: slope poor filter depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
DeA:					
Del Rey	Severe: percs slowly wetness	Slight	Severe: too clayey wetness	Severe: wetness	Poor: hard to pack too clayey wetness
DuA:					
Dunbridge	Severe: poor filter depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: small stones thin layer depth to rock
DuB:					
Dunbridge	Severe: poor filter depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: small stones thin layer depth to rock
EcA:					
Elliott	Severe: percs slowly wetness	Slight	Severe: wetness	Severe: wetness	Poor: wetness
EdB:					
Ellsworth	Severe: percs slowly wetness	Moderate: slope	Severe: too clayey wetness	Moderate: wetness	Poor: hard to pack too clayey
EdC2:					
Ellsworth	Severe: percs slowly wetness	Severe: slope	Severe: too clayey wetness	Moderate: slope wetness	Poor: hard to pack too clayey
EnA:					
Elnora	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: too sandy
EoA:					
Elnora	Severe: wetness poor filter	Severe: seepage wetness	Severe: seepage wetness depth to rock	Severe: seepage wetness	Poor: too sandy

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EsA:					
Endoaquents	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Poor: ponding
FnA:					
Fluvaquents	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding ponding	Severe: flooding ponding	Poor: ponding
FoB:					
Fox	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage small stones too sandy
FrA:					
Fries	Severe: percs slowly ponding depth to rock	Severe: ponding depth to rock	Severe: too clayey ponding depth to rock	Severe: ponding depth to rock	Poor: hard to pack too clayey depth to rock
FuA:					
Fulton	Severe: percs slowly wetness	Slight	Severe: too clayey wetness	Severe: wetness	Poor: hard to pack too clayey wetness
GdA:					
Gilford	Severe: ponding poor filter	Severe: seepage ponding	Severe: seepage ponding	Severe: seepage ponding	Poor: thin layer ponding
HdA:					
Harrod	Severe: flooding wetness depth to rock	Severe: flooding seepage depth to rock	Severe: flooding seepage depth to rock	Severe: flooding seepage depth to rock	Poor: depth to rock
HkA:					
Haskins	Severe: percs slowly wetness	Moderate: seepage	Severe: too clayey wetness	Severe: wetness	Poor: too clayey wetness
HoA:					
Holly	Severe: flooding percs slowly wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: wetness
HpB:					
Hornell	Severe: percs slowly wetness depth to rock	Severe: depth to rock	Severe: too clayey wetness depth to rock	Severe: wetness depth to rock	Poor: hard to pack too clayey depth to rock
HrB:					
Hornell	Severe: percs slowly wetness depth to rock	Severe: depth to rock	Severe: too clayey wetness depth to rock	Severe: wetness depth to rock	Poor: hard to pack too clayey depth to rock

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HsA:					
Hornell----------------	Severe: percs slowly wetness depth to rock	Severe: depth to rock	Severe: too clayey wetness depth to rock	Severe: wetness depth to rock	Poor: hard to pack too clayey depth to rock
JtA:					
Jimtown----------------	Severe: wetness	Severe: seepage wetness	Severe: seepage too sandy wetness	Severe: seepage wetness	Poor: wetness
JuA:					
Joliet-----------------	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: hard to pack wetness depth to rock
KbA:					
Kibbie-----------------	Severe: wetness	Severe: wetness	Severe: too sandy wetness	Severe: wetness	Poor: too sandy wetness
MaA:					
Mahoning---------------	Severe: percs slowly wetness	Slight	Severe: too clayey wetness	Severe: wetness	Poor: hard to pack too clayey wetness
MaB:					
Mahoning---------------	Severe: percs slowly wetness	Moderate: slope	Severe: too clayey wetness	Severe: wetness	Poor: hard to pack too clayey wetness
MbB:					
Marblehead-------------	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
MeA:					
Mermill----------------	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: too clayey ponding
MfA:					
Milford----------------	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: hard to pack too clayey ponding
MgA:					
Millgrove--------------	Severe: ponding	Severe: seepage ponding	Severe: seepage ponding	Severe: seepage ponding	Poor: small stones ponding
MmA:					
Millsdale--------------	Severe: percs slowly ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Severe: ponding depth to rock	Poor: hard to pack too clayey depth to rock

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MnA:					
Milton	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: thin layer too clayey depth to rock
MnB:					
Milton	Severe: percs slowly depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: thin layer too clayey depth to rock
MrA:					
Miner	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: hard to pack too clayey ponding
MsA:					
Miner	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding depth to rock	Severe: ponding	Poor: hard to pack too clayey ponding
MxA:					
Mitiwanga	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: thin layer wetness depth to rock
MxB:					
Mitiwanga	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: thin layer wetness depth to rock
NoA:					
Nolin	Severe: flooding wetness	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding wetness	Fair: wetness
OaB:					
Oakville	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
OgA:					
Ogontz	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness	Fair: wetness
OhB:					
Ogontz	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness	Fair: wetness
OmA:					
Olmstead	Severe: ponding	Severe: seepage ponding	Severe: seepage ponding	Severe: seepage ponding	Poor: ponding

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
OpA: Orrville	Severe: flooding wetness	Severe: flooding seepage wetness	Severe: flooding seepage depth to rock	Severe: flooding wetness	Poor: wetness
OrA: Orrville	Severe: flooding wetness	Severe: flooding seepage wetness	Severe: flooding seepage depth to rock	Severe: flooding wetness	Poor: wetness
OsB: Oshtemo	Severe: poor filter	Severe: seepage	Severe: seepage	Severe: seepage	Poor: seepage
PcA: Pewamo	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: hard to pack too clayey ponding
PmA: Plumbrook	Severe: wetness	Severe: seepage wetness	Severe: too sandy wetness	Severe: seepage wetness	Poor: seepage too sandy wetness
RaA: Randolph	Severe: percs slowly wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Severe: wetness depth to rock	Poor: hard to pack too clayey depth to rock
RcA: Rawson	Severe: percs slowly wetness	Moderate: seepage	Severe: too clayey	Moderate: wetness	Poor: too clayey
RcB: Rawson	Severe: percs slowly wetness	Moderate: seepage slope	Severe: too clayey	Moderate: wetness	Poor: too clayey
RgA: Rimer	Severe: percs slowly wetness	Severe: seepage	Severe: too clayey wetness	Severe: seepage wetness	Poor: too clayey wetness
RhA: Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: hard to pack depth to rock
RhB: Ritchey	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
RhC: Ritchey	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SaA:					
Sandusky	Severe: percs slowly wetness	Severe: seepage	Severe: too clayey wetness	Severe: seepage wetness	Poor: hard to pack too clayey wetness
SbF:					
Saylesville	Severe: percs slowly slope wetness	Severe: slope	Severe: slope	Severe: slope	Poor: slope
ShB:					
Shinrock	Severe: percs slowly wetness	Severe: wetness	Moderate: too clayey wetness	Moderate: wetness	Fair: too clayey wetness
SkC2:					
Shinrock	Severe: percs slowly wetness	Severe: slope wetness	Moderate: slope too clayey wetness	Moderate: slope wetness	Fair: slope too clayey wetness
SkD2:					
Shinrock	Severe: percs slowly slope wetness	Severe: slope wetness	Severe: slope	Severe: slope	Poor: slope
SpB:					
Spinks	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
SpD:					
Spinks	Severe: slope poor filter	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope	Poor: seepage slope too sandy
TgA:					
Tioga	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage
TnA:					
Toledo	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: hard to pack too clayey ponding
ToA:					
Toledo	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: hard to pack too clayey ponding
TpA:					
Toledo	Severe: percs slowly ponding	Severe: ponding	Severe: too clayey ponding	Severe: ponding	Poor: hard to pack too clayey ponding

Table 15.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TuA:					
Tuscola	Severe: wetness	Severe: wetness	Severe: too sandy wetness	Severe: wetness	Fair: wetness
TuB:					
Tuscola	Severe: wetness	Severe: wetness	Severe: too sandy wetness	Severe: wetness	Fair: wetness
UcB:					
Udipsamments.					
Spinks	Severe: poor filter	Severe: seepage	Severe: seepage too sandy	Severe: seepage	Poor: seepage too sandy
WaB:					
Wakeman	Severe: depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: depth to rock
WaC:					
Wakeman	Severe: depth to rock	Severe: seepage slope depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: depth to rock
WeA:					
Weyers	Severe: percs slowly wetness	Severe: seepage wetness	Severe: wetness	Severe: seepage wetness	Poor: small stones wetness
ZuC2:					
Zurich	Severe: wetness	Severe: seepage slope	Severe: seepage too sandy	Severe: seepage wetness	Fair: slope too sandy
ZuD2:					
Zurich	Severe: slope wetness	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope wetness	Poor: slope
ZuE2:					
Zurich	Severe: slope wetness	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope wetness	Poor: slope
ZuF:					
Zurich	Severe: slope wetness	Severe: seepage slope	Severe: seepage slope too sandy	Severe: seepage slope wetness	Poor: slope

Table 16.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AaA:				
Adrian	Poor: wetness	Probable	Improbable: too sandy	Poor: excess humus wetness
AeA:				
Algiers	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Good
AkA:				
Allis	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey wetness
AmD2:				
Amanda	Fair: low strength shrink-swell slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
AnG:				
Amanda	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
Dekalb	Poor: slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
Rock outcrop.				
BdB:				
Belmore	Good	Improbable: excess fines	Improbable: excess fines	Fair: small stones
BeA:				
Bennington	Fair: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
BgA:				
Bennington	Fair: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
BgB:				
Bennington	Fair: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
BkA:				
Bixler	Fair: shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Fair: too sandy
BkB:				
Bixler	Fair: shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Fair: too sandy

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BvG:				
Brecksville	Poor: low strength slope depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
CaA:				
Cardington	Fair: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
CaB:				
Cardington	Fair: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
CbC2:				
Cardington	Fair: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
CcA:				
Castalia	Poor: large stones depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: small stones
CcB:				
Castalia	Poor: large stones depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: small stones
CcD:				
Castalia	Poor: large stones depth to rock	Improbable: large stones excess fines	Improbable: large stones excess fines	Poor: slope small stones
ChB:				
Chili	Good	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones
CmA:				
Colwood	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
CnA:				
Colwood	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
CoA:				
Condit	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
CtB:				
Conotton	Good	Probable	Probable	Poor: area reclaim small stones
CuC:				
Conotton	Good	Probable	Probable	Poor: area reclaim small stones

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
DbB:				
Dekalb	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
DbD:				
Dekalb	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: slope small stones
DeA:				
Del Rey	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
DuA:				
Dunbridge	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
DuB:				
Dunbridge	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
EcA:				
Elliott	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
EdB:				
Ellsworth	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
EdC2:				
Ellsworth	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
EnA:				
Elnora	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
EoA:				
Elnora	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: too sandy
EsA:				
Endoaquents	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
FnA:				
Fluvaquents	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
FoB:				
Fox	Good	Probable	Probable	Poor: area reclaim small stones
FrA:				
Fries	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: wetness
FuA:				
Fulton	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Poor: too clayey

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
GdA:				
Gilford	Poor: wetness	Probable	Improbable: too sandy	Poor: wetness
HdA:				
Harrod	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Fair: small stones thin layer depth to rock
HkA:				
Haskins	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: small stones
HoA:				
Holly	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
HpB:				
Hornell	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey wetness
HrB:				
Hornell	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey wetness
HsA:				
Hornell	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey wetness
JtA:				
Jimtown	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones
JuA:				
Joliet	Poor: wetness depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: wetness depth to rock
KbA:				
Kibbie	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
MaA:				
Mahoning	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
MaB:				
Mahoning	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
MbB:				
Marblehead	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer depth to rock

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MeA:				
Mermill	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: wetness
MfA:				
Milford	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
MgA:				
Millgrove	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim small stones wetness
MmA:				
Millsdale	Poor: low strength shrink-swell depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer wetness
MnA:				
Milton	Poor: low strength depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
MnB:				
Milton	Poor: low strength depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer
MrA:				
Miner	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
MsA:				
Miner	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
MxA:				
Mitiwanga	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
MxB:				
Mitiwanga	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
NoA:				
Nolin	Good	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too clayey
OaB:				
Oakville	Good	Probable	Improbable: too sandy	Poor: too sandy
OgA:				
Ogontz	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: too clayey

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
OhB:				
Ogontz	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
OmA:				
Olmstead	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
OpA:				
Orrville	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim small stones
OrA:				
Orrville	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim small stones
OsB:				
Oshtemo	Good	Probable	Probable	Poor: small stones
PcA:				
Pewamo	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones too clayey wetness
PmA:				
Plumbrook	Fair: wetness	Probable	Improbable: too sandy	Fair: thin layer
RaA:				
Randolph	Poor: low strength depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
RcA:				
Rawson	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: small stones
RcB:				
Rawson	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: small stones
RgA:				
Rimer	Poor: low strength shrink-swell	Improbable: excess fines	Improbable: excess fines	Fair: area reclaim too sandy
RhA:				
Ritchey	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer depth to rock
RhB:				
Ritchey	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer depth to rock

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
RhC:				
Ritchey	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: thin layer depth to rock
SaA:				
Sandusky	Poor: low strength wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
SbF:				
Saylesville	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
ShB:				
Shinrock	Fair: shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
SkC2:				
Shinrock	Fair: shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
SkD2:				
Shinrock	Fair: shrink-swell slope wetness	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
SpB:				
Spinks	Good	Probable	Improbable: too sandy	Fair: too sandy
SpD:				
Spinks	Fair: slope	Probable	Improbable: too sandy	Poor: slope
TgA:				
Tioga	Good	Probable	Probable	Poor: area reclaim small stones
TnA:				
Toledo	Poor: low strength shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
ToA:				
Toledo	Poor: low strength shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness
TpA:				
Toledo	Poor: low strength shrink-swell wetness	Improbable: excess fines	Improbable: excess fines	Poor: too clayey wetness

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
TuA:				
Tuscola	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
TuB:				
Tuscola	Fair: wetness	Improbable: excess fines	Improbable: excess fines	Fair: too clayey
UcB:				
Udipsamments.				
Spinks	Good	Probable	Improbable: too sandy	Fair: too sandy
WaB:				
Wakeman	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
WaC:				
Wakeman	Poor: depth to rock	Improbable: excess fines	Improbable: excess fines	Poor: small stones
WeA:				
Weyers	Poor: wetness	Improbable: excess fines	Improbable: excess fines	Poor: small stones wetness
ZuC2:				
Zurich	Good	Improbable: excess fines	Improbable: excess fines	Fair: slope too clayey
ZuD2:				
Zurich	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
ZuE2:				
Zurich	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
ZuF:				
Zurich	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope

Table 17.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AaA:							
Adrian	Severe: seepage	Severe: seepage piping ponding	Severe: slow refill cutbanks cave	Frost action subsides ponding	Percs slowly soil blowing ponding	Too sandy soil blowing ponding	Wetness
AeA:							
Algiers	Severe: seepage	Severe: piping wetness	Moderate: slow refill	Frost action	Erodes easily wetness	Erodes easily wetness	Erodes easily wetness
AkA:							
Allis	Moderate: depth to rock	Severe: thin layer wetness	Severe: no water	Percs slowly depth to rock	Wetness depth to rock droughty	Erodes easily wetness depth to rock	Erodes easily wetness droughty
AmD2:							
Amanda	Severe: slope	Moderate: piping	Severe: no water	Deep to water	Erodes easily slope	Erodes easily slope	Erodes easily slope
AnG:							
Amanda	Severe: slope	Moderate: piping	Severe: no water	Deep to water	Erodes easily slope	Erodes easily slope	Erodes easily slope
Dekalb	Severe: seepage slope	Severe: seepage piping thin layer	Severe: no water	Deep to water	Slope depth to rock droughty	Large stones slope depth to rock	Large stones slope droughty
Rock outcrop.							
BdB:							
Belmore	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Slope	Favorable	Favorable
BeA:							
Bennington	Slight	Moderate: piping wetness	Severe: no water	Frost action percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Percs slowly rooting depth wetness

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
BgA:							
Bennington	Slight	Moderate: piping wetness	Severe: no water	Frost action percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Percs slowly rooting depth wetness
BgB:							
Bennington	Moderate: slope	Moderate: piping wetness	Severe: no water	Frost action percs slowly slope	Percs slowly slope wetness	Erodes easily percs slowly wetness	Percs slowly rooting depth wetness
BkA:							
Bixler	Severe: seepage	Severe: piping	Severe: cutbanks cave	Frost action cutbanks cave	Fast intake droughty	Erodes easily too sandy wetness	Erodes easily droughty
BkB:							
Bixler	Severe: seepage	Severe: piping	Severe: cutbanks cave	Frost action slope cutbanks cave	Fast intake wetness	Erodes easily too sandy wetness	Erodes easily droughty
BvG:							
Brecksville	Severe: slope	Moderate: piping thin layer	Severe: no water	Deep to water	Percs slowly slope depth to rock	Erodes easily slope depth to rock	Erodes easily slope depth to rock
CaA:							
Cardington	Slight	Moderate: piping wetness	Severe: no water	Frost action percs slowly	Erodes easily percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly rooting depth
CaB:							
Cardington	Moderate: slope	Moderate: piping wetness	Severe: no water	Frost action percs slowly slope	Erodes easily percs slowly slope	Erodes easily percs slowly wetness	Erodes easily percs slowly rooting depth
CbC2:							
Cardington	Severe: slope	Moderate: piping wetness	Severe: no water	Frost action percs slowly slope	Erodes easily percs slowly slope	Erodes easily slope wetness	Erodes easily rooting depth slope
CcA:							
Castalia	Severe: seepage	Severe: seepage piping thin layer	Severe: no water	Deep to water	Large stones depth to rock droughty	Large stones depth to rock	Large stones depth to rock droughty

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CcB:							
Castalia	Severe: seepage	Severe: seepage piping thin layer	Severe: no water	Deep to water	Large stones slope droughty	Large stones depth to rock	Large stones depth to rock droughty
CcD:							
Castalia	Severe: seepage	Severe: seepage piping thin layer	Severe: no water	Deep to water	Large stones slope droughty	Large stones slope depth to rock	Large stones slope droughty
ChB:							
Chili	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Droughty	Favorable	Droughty
CmA:							
Colwood	Moderate: seepage	Severe: ponding	Severe: slow refill cutbanks cave	Frost action ponding	Ponding	Erodes easily ponding	Erodes easily wetness
CnA:							
Colwood	Moderate: seepage	Severe: ponding	Severe: slow refill cutbanks cave	Frost action ponding	Ponding	Erodes easily ponding	Erodes easily wetness
CoA:							
Condit	Slight	Severe: hard to pack ponding	Severe: no water	Frost action percs slowly ponding	Erodes easily percs slowly ponding	Erodes easily percs slowly ponding	Erodes easily percs slowly wetness
CtB:							
Conotton	Severe: seepage	Moderate: seepage piping	Severe: no water	Deep to water	Slope droughty	Favorable	Droughty
CuC:							
Conotton	Severe: seepage slope	Moderate: seepage piping	Severe: no water	Deep to water	Slope droughty	Slope	Slope droughty
DbB:							
Dekalb	Severe: seepage	Severe: seepage piping thin layer	Severe: no water	Deep to water	Slope depth to rock droughty	Large stones depth to rock	Large stones depth to rock droughty

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
DbD:							
Dekalb	Severe: seepage slope	Severe: seepage piping thin layer	Severe: no water	Deep to water	Slope depth to rock droughty	Large stones slope depth to rock	Large stones slope droughty
DeA:							
Del Rey	Slight	Severe: hard to pack wetness	Severe: slow refill	Frost action percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness
DuA:							
Dunbridge	Severe: seepage	Severe: piping thin layer	Severe: no water	Deep to water	Fast intake soil blowing depth to rock	Large stones depth to rock	Large stones depth to rock droughty
DuB:							
Dunbridge	Severe: seepage	Severe: piping thin layer	Severe: no water	Deep to water	Fast intake slope soil blowing	Large stones depth to rock	Large stones depth to rock droughty
EcA:							
Elliott	Slight	Severe: hard to pack wetness	Severe: slow refill	Frost action percs slowly	Percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily wetness
EdB:							
Ellsworth	Moderate: slope	Moderate: hard to pack piping wetness	Severe: no water	Frost action percs slowly slope	Percs slowly slope	Erodes easily percs slowly wetness	Erodes easily percs slowly
EdC2:							
Ellsworth	Severe: slope	Moderate: hard to pack piping wetness	Severe: no water	Frost action percs slowly slope	Percs slowly slope	Erodes easily slope wetness	Erodes easily percs slowly slope
EnA:							
Elnora	Severe: seepage	Severe: piping wetness	Severe: cutbanks cave	Slope cutbanks cave	Fast intake slope droughty	Too sandy wetness soil blowing	Droughty
EoA:							
Elnora	Severe seepage	Severe: piping wetness	Severe: cutbanks cave	Slope cutbanks cave	Fast intake slope droughty	Too sandy wetness soil blowing	Droughty

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EsA:							
Endoaquents	Severe: seepage	Severe: ponding	Severe: slow refill	Frost action ponding	Ponding droughty	Ponding	Wetness
FnA:							
Fluvaquents	Severe: seepage	Severe: piping ponding	Moderate: slow refill	Flooding frost action ponding	Flooding ponding droughty	Ponding	Wetness
FoB:							
Fox	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Erodes easily slope	Erodes easily too sandy	Erodes easily
FrA:							
Fries	Moderate: depth to rock	Severe: hard to pack thin layer ponding	Severe: slow refill	Percs slowly ponding depth to rock	Percs slowly ponding depth to rock	Percs slowly ponding depth to rock	Percs slowly wetness depth to rock
FuA:							
Fulton	Slight	Severe: hard to pack wetness	Severe: no water	Percs slowly	Percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness
GdA:							
Gilford	Severe: seepage	Severe: piping ponding	Severe: cutbanks cave	Frost action ponding	Soil blowing ponding	Soil blowing ponding	Rooting depth wetness droughty
HdA:							
Harrod	Severe: seepage	Severe: piping thin layer wetness	Severe: depth to rock	Flooding frost action depth to rock	Flooding wetness depth to rock	Wetness depth to rock	Depth to rock
HkA:							
Haskins	Moderate: seepage	Moderate: piping wetness	Severe: no water	Frost action percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily rooting depth wetness
HoA:							
Holly	Severe: seepage	Severe: piping wetness	Severe: slow refill cutbanks cave	Flooding frost action	Flooding wetness	Wetness	Wetness

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
HpB:							
Hornell----------------	Moderate: slope depth to rock	Severe: thin layer wetness	Severe: no water	Frost action percs slowly depth to rock	Percs slowly slope wetness	Erodes easily percs slowly depth to rock	Erodes easily percs slowly wetness
HrB:							
Hornell----------------	Moderate: slope depth to rock	Severe: thin layer wetness	Severe: no water	Frost action percs slowly depth to rock	Percs slowly slope wetness	Erodes easily percs slowly depth to rock	Erodes easily percs slowly wetness
HsA:							
Hornell----------------	Moderate: depth to rock	Severe: thin layer wetness	Severe: no water	Frost action percs slowly depth to rock	Erodes easily percs slowly wetness	Erodes easily percs slowly depth to rock	Erodes easily percs slowly wetness
JtA:							
Jimtown----------------	Severe: seepage	Severe: seepage piping wetness	Severe: cutbanks cave	Frost action cutbanks cave	Wetness	Too sandy wetness	Wetness
JuA:							
Joliet-----------------	Severe: depth to rock	Severe: excess humus thin layer wetness	Severe: depth to rock	Frost action depth to rock	Wetness depth to rock	Wetness depth to rock	Wetness depth to rock
KbA:							
Kibbie-----------------	Moderate: seepage	Severe: piping wetness	Severe: cutbanks cave	Frost action cutbanks cave	Wetness	Erodes easily too sandy wetness	Erodes easily wetness
MaA:							
Mahoning---------------	Slight	Severe: wetness	Severe: no water	Frost action percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness
MaB:							
Mahoning---------------	Moderate: slope	Severe: wetness	Severe: no water	Frost action percs slowly slope	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness
MbB:							
Marblehead-------------	Severe: depth to rock	Severe: thin layer	Severe: no water	Deep to water	Slope depth to rock	Depth to rock	Depth to rock

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
MeA: Mermill	Moderate: seepage	Severe: ponding	Severe: no water	Frost action percs slowly ponding	Erodes easily percs slowly ponding	Erodes easily percs slowly ponding	Erodes easily rooting depth wetness
MfA: Milford	Slight	Severe: ponding	Severe: slow refill	Frost action ponding	Ponding	Erodes easily ponding	Erodes easily wetness
MgA: Millgrove	Severe: seepage	Severe: piping ponding	Severe: cutbanks cave	Frost action ponding cutbanks cave	Ponding	Too sandy ponding	Wetness
MmA: Millsdale	Moderate: depth to rock	Severe: thin layer ponding	Severe: no water	Frost action thin layer ponding	Ponding depth to rock	Ponding depth to rock	Wetness depth to rock
MnA: Milton	Moderate: seepage depth to rock	Severe: thin layer	Severe: no water	Deep to water	Erodes easily depth to rock	Erodes easily depth to rock	Erodes easily depth to rock
MnB: Milton	Moderate: seepage slope depth to rock	Severe: thin layer	Severe: no water	Deep to water	Erodes easily slope depth to rock	Erodes easily depth to rock	Erodes easily depth to rock
MrA: Miner	Slight	Severe: ponding	Severe: no water	Frost action percs slowly ponding	Percs slowly ponding	Percs slowly ponding	Percs slowly wetness
MsA: Miner	Moderate: depth to rock	Severe: ponding	Severe: no water	Frost action percs slowly ponding	Percs slowly ponding	Percs slowly ponding	Percs slowly wetness
MxA: Mitiwanga	Moderate: seepage depth to rock	Severe: piping thin layer	Severe: no water	Frost action depth to rock	Wetness depth to rock	Wetness depth to rock	Wetness depth to rock

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
MxB: Mitiwanga	Moderate: seepage depth to rock	Severe: piping thin layer	Severe: no water	Frost action slope depth to rock	Slope wetness depth to rock	Wetness depth to rock	Wetness depth to rock
NoA: Nolin	Severe: seepage	Severe: piping	Moderate: slow refill deep to water	Deep to water	Erodes easily flooding	Erodes easily	Erodes easily
OaB: Oakville	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Fast intake slope droughty	Too sandy soil blowing	Droughty
OgA: Ogontz	Moderate: seepage	Severe: piping wetness	Moderate: slow refill	Frost action	Erodes easily soil blowing	Erodes easily wetness soil blowing	Erodes easily
OhB: Ogontz	Moderate: seepage slope	Severe: piping wetness	Moderate: slow refill	Frost action slope	Erodes easily slope	Erodes easily wetness	Erodes easily
OmA: Olmstead	Severe: seepage	Severe: piping ponding	Severe: cutbanks cave	Frost action ponding cutbanks cave	Ponding	Too sandy ponding	Wetness
OpA: Orrville	Severe: seepage	Severe: piping wetness	Severe: cutbanks cave	Flooding frost action	Erodes easily flooding wetness	Erodes easily wetness	Erodes easily wetness
OrA: Orrville	Severe: seepage	Severe: piping wetness	Severe: cutbanks cave	Flooding frost action	Erodes easily flooding wetness	Erodes easily wetness	Erodes easily wetness
OsB: Oshtemo	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Fast intake slope soil blowing	Too sandy soil blowing	Favorable

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
PcA: Pewamo	Slight	Severe: ponding	Severe: slow refill	Frost action ponding	Ponding	Erodes easily ponding	Wetness
PmA: Plumbrook	Severe: seepage	Severe: seepage piping	Severe: no water	Frost action cutbanks cave	Wetness soil blowing	Wetness soil blowing	Wetness
RaA: Randolph	Moderate: depth to rock	Severe: thin layer	Severe: no water	Frost action depth to rock	Erodes easily wetness depth to rock	Erodes easily wetness depth to rock	Erodes easily wetness depth to rock
RcA: Rawson	Moderate: seepage	Moderate: piping wetness	Severe: no water	Percs slowly	Wetness soil blowing	Wetness soil blowing	Percs slowly rooting depth
RcB: Rawson	Moderate: seepage slope	Moderate: piping wetness	Severe: no water	Percs slowly slope	Slope wetness soil blowing	Wetness soil blowing	Percs slowly rooting depth
RgA: Rimer	Severe: seepage	Moderate: piping wetness	Severe: no water	Frost action percs slowly	Fast intake wetness droughty	Percs slowly wetness soil blowing	Rooting depth wetness droughty
RhA: Ritchey	Severe: depth to rock	Severe: thin layer	Severe: no water	Deep to water	Erodes easily depth to rock	Erodes easily depth to rock	Erodes easily depth to rock
RhB: Ritchey	Severe: depth to rock	Severe: thin layer	Severe: no water	Deep to water	Erodes easily slope depth to rock	Erodes easily depth to rock	Erodes easily depth to rock
RhC: Ritchey	Severe: slope depth to rock	Severe: thin layer	Severe: no water	Deep to water	Erodes easily slope depth to rock	Erodes easily slope depth to rock	Erodes easily slope depth to rock
SaA: Sandusky	Severe: seepage	Severe: hard to pack wetness	Severe: no water	Frost action percs slowly	Erodes easily percs slowly wetness	Erodes easily percs slowly wetness	Erodes easily rooting depth wetness

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
SbF:							
Saylesville	Severe: slope	Moderate: hard to pack piping	Severe: no water	Deep to water	Erodes easily slope	Erodes easily slope	Erodes easily slope
ShB:							
Shinrock	Moderate: seepage slope	Severe: piping	Severe: no water	Frost action slope cutbanks cave	Erodes easily slope wetness	Erodes easily wetness	Erodes easily
SkC2:							
Shinrock	Severe: slope	Severe: piping	Severe: no water	Frost action slope cutbanks cave	Erodes easily slope wetness	Erodes easily slope wetness	Erodes easily slope
SkD2:							
Shinrock	Severe: slope	Severe: piping	Severe: no water	Frost action slope cutbanks cave	Erodes easily slope wetness	Erodes easily slope wetness	Erodes easily slope
SpB:							
Spinks	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Fast intake slope droughty	Too sandy soil blowing	Droughty
SpD:							
Spinks	Severe: seepage slope	Severe: seepage piping	Severe: no water	Deep to water	Fast intake slope droughty	Slope too sandy soil blowing	Slope droughty
TgA:							
Tioga	Severe: seepage	Severe: piping	Severe: cutbanks cave	Deep to water	Erodes easily flooding droughty	Erodes easily	Erodes easily droughty
TnA:							
Toledo	Slight	Severe: hard to pack ponding	Severe: no water	Frost action percs slowly ponding	Percs slowly ponding	Percs slowly ponding	Percs slowly wetness
ToA:							
Toledo	Slight	Severe: hard to pack ponding	Severe: no water	Frost action percs slowly ponding	Percs slowly slow intake ponding	Percs slowly ponding	Percs slowly wetness

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
TpA:							
Toledo	Slight	Severe: hard to pack ponding	Severe: no water	Frost action percs slowly ponding	Percs slowly slow intake ponding	Percs slowly ponding	Percs slowly wetness
TuA:							
Tuscola	Moderate: seepage	Severe: piping wetness	Severe: cutbanks cave	Frost action cutbanks cave	Soil blowing	Wetness	Favorable
TuB:							
Tuscola	Moderate: seepage slope	Severe: piping wetness	Severe: cutbanks cave	Frost action slope cutbanks cave	Slope soil blowing	Wetness	Favorable
UcB:							
Udipsamments.							
Spinks	Severe: seepage	Severe: seepage piping	Severe: no water	Deep to water	Fast intake slope droughty	Too sandy soil blowing	Droughty
WaB:							
Wakeman	Severe: seepage	Severe: seepage piping thin layer	Severe: no water	Deep to water	Slope soil blowing depth to rock	Soil blowing depth to rock	Depth to rock
WaC:							
Wakeman	Severe: seepage slope	Severe: seepage piping thin layer	Severe: no water	Deep to water	Slope soil blowing depth to rock	Slope soil blowing depth to rock	Slope depth to rock
WeA:							
Weyers	Severe: seepage	Severe: seepage piping wetness	Severe: slow refill cutbanks cave	Frost action cutbanks cave	Percs slowly wetness droughty	Percs slowly too sandy wetness	Rooting depth wetness droughty
ZuC2:							
Zurich	Severe: seepage slope	Severe: piping	Moderate: deep to water	Frost action slope	Erodes easily slope	Erodes easily slope wetness	Erodes easily slope

Table 17.--Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
ZuD2:							
Zurich-----------------	Severe: seepage slope	Severe: piping	Moderate: deep to water	Frost action slope	Erodes easily slope	Erodes easily slope wetness	Erodes easily slope
ZuE2:							
Zurich-----------------	Severe: seepage slope	Severe: piping	Moderate: deep to water	Frost action slope	Erodes easily slope	Erodes easily slope wetness	Erodes easily slope
ZuF:							
Zurich-----------------	Severe: seepage slope	Severe: piping	Moderate: deep to water	Frost action slope	Erodes easily slope	Erodes easily slope wetness	Erodes easily slope

Table 18.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
AaA:												
Adrian----------	0-28	Muck	PT	A-8	---	---	---	---	---	---	---	---
	28-80	Sand, loamy sand, fine sand	SM, SP	A-1, A-2, A-3	0	0	80-100	60-100	35-75	0-30	0-14	NP-4
AeA:												
Algiers---------	0-31	Silt loam	ML	A-4	0	0	100	90-100	80-95	70-85	30-40	4-10
	31-51	Silty clay loam, silt loam, clay loam	CL, ML	A-4, A-6, A-7	0	0	100	90-100	80-95	70-85	30-45	7-19
	51-80	Fine sandy loam, silt loam, silty clay loam	CL, ML	A-6, A-4	0	0	95-100	90-100	70-100	40-90	10-40	7-18
AkA:												
Allis-----------	0-6	Clay loam	CL, ML	A-6, A-7	0	0	80-100	75-100	70-100	55-90	35-45	10-20
	6-28	Silty clay loam, clay, very channery silty clay	GC, CL, GM, ML	A-6, A-7	0	5-10	50-100	45-100	25-95	20-90	35-45	10-20
	28-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
AmD2:												
Amanda----------	0-5	Loam	CL, ML, CL-ML	A-4	0	0-5	90-100	85-100	75-100	55-90	20-35	3-10
	5-27	Clay loam, loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	85-100	80-100	60-95	25-40	5-20
	27-34	Clay loam, loam	CL-ML, CL, ML	A-4, A-6	0	0-5	85-100	75-95	70-95	55-75	25-40	5-20
	34-80	Loam, silt loam	CL, CL-ML, ML	A-4	0	0-5	85-100	75-95	65-95	50-85	20-35	3-10
AnG:												
Amanda----------	0-5	Loam	CL-ML, CL, ML	A-4	0	0-5	90-100	85-100	75-100	55-90	20-35	3-10
	5-38	Clay loam, loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	85-100	80-100	60-95	25-40	5-20
	38-52	Clay loam, loam	CL, ML, CL-ML	A-4, A-6	0	0-5	85-100	75-95	70-95	55-75	25-40	5-20
	52-80	Loam, silt loam	CL, CL-ML, ML	A-4	0	0-5	85-100	75-95	65-95	50-85	20-35	3-10

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
AnG:												
Dekalb----------	0-5	Very channery loam	GM, SM, ML, CL-ML	A-4, A-2, A-1	0	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-23	Extremely flaggy sandy loam, channery loam, very channery sandy loam	GM, GC-GM, ML, SM	A-1, A-2, A-4	---	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	23-25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
BdB:												
Belmore---------	0-9	Loam	CL, CL-ML, ML	A-4	0	0	85-100	80-100	60-90	50-80	20-32	3-10
	9-41	Sandy clay loam, clay loam, loam	CL-ML, CL, SC, SC-SM	A-4, A-6	0	0	85-100	65-95	55-75	40-70	20-36	4-14
	41-60	Gravelly sandy loam, gravelly loam, very gravelly sandy loam	SC, ML, SC-SM, SM	A-1, A-2, A-4	0	0	80-100	50-95	30-75	15-60	15-30	NP-10
BeA:												
Bennington------	0-12	Loam	CL, ML, CL-ML	A-4, A-6	0	0-2	95-100	90-100	85-100	65-90	22-38	3-14
	12-34	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0-2	85-100	80-100	75-100	70-95	30-52	12-30
	34-80	Clay loam, silty clay loam, loam	CL, CL-ML	A-4, A-6	0-1	0-2	80-100	75-100	70-100	60-90	25-40	6-18
BgA:												
Bennington------	0-9	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0-2	95-100	90-100	85-100	65-90	22-38	3-14
	9-29	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0-2	85-100	80-100	75-100	70-95	30-52	12-30
	29-80	Clay loam, silty clay loam, loam	CL, CL-ML	A-4, A-6	0-1	0-2	80-100	75-100	70-100	60-90	25-40	6-18

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BgB:												
Bennington------	0-8	Silt loam	CL-ML, ML, CL	A-4, A-6	0	0-2	95-100	90-100	85-100	65-90	22-38	3-14
	8-32	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0-2	85-100	80-100	75-100	70-95	30-52	12-30
	32-80	Clay loam, silty clay loam, loam	CL, CL-ML	A-4, A-6	0-1	0-2	80-100	75-100	70-100	60-90	25-40	6-18
BkA:												
Bixler----------	0-10	Loamy fine sand	SM	A-2, A-4	0	0	100	95-100	70-85	30-50	0-14	NP-4
	10-27	Loamy sand, loamy fine sand, fine sand	SM	A-2, A-4	0	0	100	95-100	60-85	20-45	0-14	NP-4
	27-37	Sandy loam, loam, fine sandy loam	SC, SC-SM, ML, SM	A-2, A-4	0	0	100	95-100	60-90	30-70	10-25	NP-10
	37-80	Stratified fine sand to silty clay loam	ML, CL, SC, SM	A-4, A-6	0	0	100	95-100	70-100	35-90	10-35	3-20
BkB:												
Bixler----------	0-10	Loamy fine sand	SM	A-2, A-4	0	0	100	95-100	70-85	30-50	0-14	NP-4
	10-26	Loamy sand, loamy fine sand, fine sand	SM	A-2, A-4	0	0	100	95-100	60-85	20-45	0-14	NP-4
	26-80	Stratified fine sand to silty clay loam	CL, SM, ML, SC	A-4, A-6	0	0	100	95-100	70-100	35-90	10-35	3-20
BvG:												
Brecksville-----	0-5	Silt loam	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	75-100	60-90	25-40	5-15
	5-17	Silty clay loam, channery silty clay loam, silt loam	CL	A-6, A-7	0	0-5	75-100	65-100	60-95	55-85	30-45	10-25
	17-24	Very channery silty clay loam, channery silty clay, silty clay loam	CL	A-6, A-7	0	0-10	70-95	55-95	50-95	50-90	30-45	15-25
	24-26	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CaA:												
Cardington------	0-16	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0-2	95-100	90-100	80-100	65-90	25-40	4-15
	16-34	Silty clay loam, clay loam, silty clay	CL, ML	A-6, A-7	0	0-2	80-100	75-100	70-100	65-90	30-50	10-30
	34-80	Clay loam, silty clay loam, loam	CL-ML, CL, ML	A-4, A-6	0-1	0-5	80-100	75-100	70-95	65-85	22-40	3-18
CaB:												
Cardington------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0-2	95-100	90-100	80-100	65-90	25-40	4-15
	9-30	Silty clay loam, clay loam, silty clay	CL, ML	A-6, A-7	0	0-2	80-100	75-100	70-100	65-90	30-50	10-30
	30-80	Clay loam, silty clay loam, loam	CL, CL-ML, ML	A-4, A-6	0-1	0-5	80-100	75-100	70-95	65-85	22-40	3-18
CbC2:												
Cardington------	0-6	Silty clay loam	CL, ML	A-6, A-7	0	0-2	95-100	90-100	90-100	80-95	35-45	10-20
	6-29	Silty clay loam, clay loam, silty clay	CL, ML	A-6, A-7	0	0-2	80-100	75-100	70-100	65-90	30-50	10-30
	29-80	Clay loam, silty clay loam, loam	CL-ML, CL, ML	A-4, A-6	0-1	0-5	80-100	75-100	70-95	65-85	22-40	3-18
CcA:												
Castalia--------	0-8	Very channery loam	GM, ML	A-2, A-1, A-4	0-15	20-40	45-65	25-60	20-60	15-55	15-30	NP-8
	8-16	Extremely channery loam, very flaggy sandy loam	GM, ML, SM	A-1, A-2, A-4	0-40	10-50	45-80	25-70	15-65	15-55	15-30	NP-8
	16-24	Very channery silt loam, very flaggy sandy loam, extremely flaggy loam	SM, ML, GM	A-1, A-2, A-4	0-60	30-80	50-85	40-80	30-70	15-55	15-30	NP-8
	24-26	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CcB:												
Castalia--------	0-8	Very channery loam	GM, ML	A-1, A-2, A-4	0-15	20-40	45-65	25-60	20-60	15-55	15-30	NP-8
	8-13	Extremely channery loam, very channery silt loam	SM, GM, ML	A-1, A-4, A-2	0-40	10-50	45-80	25-70	15-65	15-55	15-30	NP-8
	13-24	Very channery loam, very flaggy sandy loam, extremely channery loam	SM, ML, SC	A-1, A-2, A-4	0-60	30-80	50-85	40-80	30-70	15-55	15-30	NP-8
	24-26	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
CcD:												
Castalia--------	0-7	Very channery loam	GM, ML	A-1, A-4, A-2	0-15	20-40	45-65	25-60	20-60	15-55	15-30	NP-8
	7-16	Extremely channery loam, very flaggy sandy loam	GM, SM, ML	A-1, A-4, A-2	0-40	10-50	45-80	25-70	15-65	15-55	15-30	NP-8
	16-23	Very channery loam, very flaggy sandy loam, extremely flaggy loam	GM, SM, ML	A-2, A-1, A-4	0-60	30-80	50-85	40-80	30-70	15-55	15-30	NP-8
	23-25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
ChB:												
Chili-----------	0-9	Loam	CL-ML, ML	A-4	0	0	85-100	75-100	65-85	55-75	25-35	4-10
	9-23	Clay loam, gravelly clay loam, loam	GM, CL, ML, SM	A-2, A-4, A-1-b, A-6	0	0	65-100	55-100	35-70	20-65	15-30	NP-12
	23-41	Gravelly loam, gravelly coarse sandy loam	GM, GC-GM, SC-SM, SM	A-1, A-2	0	0-5	45-80	30-75	25-65	15-35	15-30	NP-8
	41-80	Gravelly sandy loam, sandy loam, loam	ML, SM, SC, SC-SM	A-1, A-2, A-4	0	0-5	80-100	40-90	30-90	15-80	15-30	NP-8

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CmA:												
Colwood---------	0-11	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	85-100	60-90	15-35	2-12
	11-53	Loam, silty clay loam, silt loam	CL	A-6, A-4, A-7	0	0	100	100	80-100	50-90	25-45	8-20
	53-80	Stratified loamy sand to silt loam	CL, ML, SM, SC	A-2, A-4	0	0	100	85-100	50-100	30-80	15-25	NP-10
CnA:												
Colwood---------	0-14	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	85-100	60-90	15-35	2-12
	14-36	Fine sandy loam, silty clay loam, silt loam	ML, CL	A-4, A-6, A-7	0	0	100	100	80-100	50-90	25-45	8-20
	36-47	Fine sandy loam, silt loam, silty clay loam	CL, ML	A-7, A-6, A-4	0	0	100	95-100	70-100	30-80	25-45	8-20
	47-49	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
CoA:												
Condit----------	0-10	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0-2	95-100	95-100	90-100	80-90	22-40	3-16
	10-45	Silty clay loam, clay, silty clay	CH, CL	A-6, A-7	0	0-2	95-100	85-100	80-100	70-90	35-55	12-28
	45-80	Silty clay loam, clay loam, loam	CL, CL-ML	A-4, A-6	0-1	0-2	90-100	80-100	70-95	65-85	25-40	6-18
CtB:												
Conotton--------	0-9	Loam	ML	A-4	0	0-5	85-100	70-85	65-80	50-65	15-30	NP-6
	9-39	Extremely gravelly sandy loam, gravelly loam, gravelly coarse sandy loam	GM, SC-SM, GC-GM, SM	A-2	0	0-15	35-70	10-70	10-60	10-55	15-25	NP-6
	39-80	Stratified very gravelly sand to very gravelly loamy coarse sand	GW-GM, GM, SM, SW-SM	A-1	0	0-15	10-80	5-75	5-50	5-30	0-20	NP-4

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CuC:												
Conotton--------	0-8	Gravelly loam	GM, ML, SM	A-2, A-4	0	0-5	65-90	45-80	40-70	25-55	15-30	NP-6
	8-40	Extremely gravelly sandy loam, gravelly loam, extremely gravelly coarse sandy loam	GM, GC-GM, SC-SM, SM	A-2	0	0-15	35-70	10-70	10-60	10-55	15-25	NP-6
	40-80	Stratified extremely gravelly sand to gravelly loamy coarse sand	GM, SW-SM, GW-GM, SM	A-1	0	0-15	10-80	5-75	5-50	5-30	0-20	NP-4
DbB:												
Dekalb----------	0-9	Channery loam	GM, CL-ML, ML, SM	A-1, A-2, A-4	0	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	9-30	Channery sandy loam, extremely channery loam, very channery sandy loam	GM, GC-GM, ML, SM	A-1, A-2, A-4	0	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	30-32	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
DbD:												
Dekalb----------	0-5	Channery loam	CL-ML, SM, GM, ML	A-1, A-2, A-4	0	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	5-21	Very flaggy sandy loam, channery loam, very channery sandy loam	GC-GM, GM, SM, ML	A-1, A-2, A-4	0	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	21-23	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
DeA:												
Del Rey---------	0-11	Silt loam	CL	A-6, A-7	0	0	95-100	95-100	90-100	70-95	25-45	10-25
	11-46	Silty clay loam, silty clay	CH, CL	A-7	0	0	95-100	95-100	90-100	85-95	40-55	20-30
	46-80	Silt loam, silty clay loam	CL	A-6, A-7	0	0	95-100	95-100	90-100	70-95	30-45	10-25

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
DuA:												
Dunbridge-------	0-13	Loamy sand	SM, SP-SM	A-2, A-1, A-4	0	0-5	90-100	75-100	40-80	10-45	0-14	NP-4
	13-23	Fine sandy loam, clay loam, loam	ML, CL, SC, SM	A-2, A-4, A-6	0-1	0-5	75-95	50-95	35-90	20-75	15-35	2-18
	23-29	Cobbly loam, very stony sandy clay loam, cobbly clay loam	GM, GP-GM, ML, CL	A-3, A-4, A-2, A-1	0-10	0-25	30-90	30-75	10-75	5-65	15-30	NP-15
	29-31	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
DuB:												
Dunbridge-------	0-17	Loamy sand	SM, SP-SM	A-2, A-1, A-4	0	0-5	90-100	75-100	40-80	10-45	0-14	NP-4
	17-31	Sandy loam, clay loam, loam	ML, CL, SC, SM	A-2, A-4, A-6	0-1	0-5	75-95	50-95	35-90	20-75	15-35	2-18
	31-33	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
EcA:												
Elliott---------	0-15	Silt loam	CL	A-4, A-6	0	0	95-100	95-100	95-100	75-100	30-40	8-18
	15-49	Silty clay, silty clay loam, clay loam	CH, CL	A-6, A-7	0	0-5	95-100	90-100	90-100	70-100	30-52	11-26
	49-65	Silty clay loam, clay loam	CL	A-6, A-7	0-1	0-5	90-100	85-100	80-100	70-95	28-45	11-24
	65-67	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
EdB:												
Ellsworth-------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0-1	100	90-100	90-100	75-90	25-40	4-14
	8-30	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0-1	95-100	85-100	85-100	80-95	35-55	14-28
	30-80	Clay loam, silty clay loam	CL	A-4, A-6, A-7	0-1	0-2	90-100	85-100	80-100	70-95	30-45	8-22

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EdC2:												
Ellsworth-------	0-7	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0-1	100	90-100	90-100	75-90	25-40	4-14
	7-44	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0-1	95-100	85-100	85-100	80-95	35-55	14-28
	44-80	Clay loam, silty clay loam	CL	A-4, A-6, A-7	0-1	0-2	90-100	85-100	80-100	70-95	30-45	8-22
EnA:												
Elnora----------	0-10	Loamy fine sand	ML, SM	A-2, A-4	0	0	100	100	70-95	25-60	0-14	NP-4
	10-31	Loamy fine sand, fine sand	SM	A-2, A-4	0	0	100	100	70-95	25-45	0-14	NP-4
	31-80	Fine sand, loamy fine sand	SM	A-2, A-4	0	0	100	100	60-85	20-45	0-14	NP-4
EoA:												
Elnora----------	0-14	Loamy fine sand	SM, ML	A-2, A-4	0	0	100	100	70-95	25-60	0-14	NP-4
	14-45	Loamy fine sand, fine sand	SM	A-2, A-4	0	0	100	100	70-95	24-45	0-14	NP-4
	45-55	Stratified fine sand to very channery fine sandy loam	SM	A-2, A-4	0	0-2	90-100	35-100	30-85	20-45	0-14	NP-4
	55-57	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
EsA:												
Endoaquents-----	0-80	Varies	---	---	---	---	---	---	---	---	---	---
FnA:												
Fluvaquents-----	0-80	Varies	---	---	---	---	---	---	---	---	---	---
FoB:												
Fox-------------	0-5	Loam	CL-ML, CL, ML	A-4	0	0	95-100	85-100	80-95	65-90	15-25	3-8
	5-28	Clay loam, sandy loam, loam	CL, GC, SC	A-2, A-6, A-7	0-1	0-5	65-100	55-100	30-100	15-80	22-45	10-25
	28-80	Extremely cobbly coarse sand, sand, gravelly coarse sand	GP, GP-GM, SP-SM, SP	A-1, A-2, A-3	0-3	0-35	10-85	10-85	5-75	2-10	0-14	NP-4

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
FrA:												
Fries-----------	0-10	Silty clay loam	CL	A-7	0	0	100	90-100	85-100	75-95	40-50	20-30
	10-28	Clay, silty clay, clay loam	CH, CL, MH	A-7	0-1	0-2	90-100	85-100	80-100	70-95	40-60	15-35
	28-30	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
FuA:												
Fulton----------	0-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	85-100	85-95	35-50	12-24
	9-29	Silty clay, clay	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-40
	29-36	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-40
	36-80	Silty clay, clay, silty clay loam	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
GdA:												
Gilford---------	0-12	Fine sandy loam	SC, SC-SM, SM	A-2-4, A-4	0	0	95-100	95-100	60-80	30-45	15-30	4-10
	12-32	Sandy loam, fine sandy loam	SC, SC-SM, SM	A-2-4	0	0	95-100	95-100	55-70	25-35	10-25	NP-8
	32-44	Loamy sand, sand, loamy fine sand	SM, SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	95-100	15-60	3-20	0-14	NP-4
	44-80	Sand, fine sand, loamy fine sand	SM, SP-SM, SP	A-1-b, A-2-4, A-3	0	0	95-100	95-100	15-60	3-20	0-14	NP-4
HdA:												
Harrod----------	0-13	Silt loam	ML, CL-ML, CL	A-4, A-6	0	0	100	90-100	85-100	70-90	20-40	3-15
	13-28	Loam, clay loam, silt loam	CL, CL-ML	A-6, A-4	0	0	95-100	75-100	65-100	50-90	20-40	4-20
	28-33	Channery sandy loam, loam, sandy clay loam	CL, SM, ML, SC	A-4, A-6, A-2	0	0-5	80-100	75-90	40-85	25-65	0-40	NP-20
	33-35	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
HkA:												
Haskins---------	0-10	Loam	CL, CL-ML	A-4, A-6	0	0	95-100	85-100	70-100	55-90	20-40	5-20
	10-32	Clay loam, gravelly sandy clay loam, loam	CL, SC	A-2, A-4, A-6	0	0	85-100	70-100	55-85	30-65	20-40	7-20
	32-80	Clay, silty clay, clay loam	CL	A-6, A-7	0	0	100	85-100	80-100	70-95	25-50	15-30
HoA:												
Holly-----------	0-8	Silt loam	ML	A-4	0	0	90-100	85-100	80-100	70-90	25-35	3-10
	8-30	Silt loam, loam, silty clay loam	ML, SM	A-4, A-6	0	0	85-100	75-100	70-95	45-85	25-40	9-18
	30-80	Silt loam, loam, sandy loam	ML, SM	A-2, A-4	0	0	85-100	65-100	50-95	25-80	25-35	4-15
HpB:												
Hornell---------	0-7	Loam	CL, ML	A-6	0	0	95-100	90-100	80-100	65-90	25-35	4-15
	7-30	Silty clay, channery silty clay loam, clay	CL, CH, GC, ML	A-6, A-7	0	0-5	60-100	50-100	45-90	35-85	35-55	10-30
	30-32	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
HrB:												
Hornell---------	0-8	Silt loam	CL, ML	A-6	0	0	95-100	90-100	80-100	65-90	25-35	4-15
	8-13	Channery silty clay, silty clay loam, clay	CL, GC, CH, ML	A-6, A-7	0	0-5	60-100	50-100	45-90	35-85	35-55	10-30
	13-32	Channery silty clay, silty clay, channery clay	CL, CH, GC, ML	A-2, A-6, A-7	0	0-5	50-100	50-100	20-75	20-70	35-55	10-30
	32-34	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
HsA:												
Hornell---------	0-12	Silty clay loam	CL, ML	A-6, A-7	0	0	95-100	90-100	80-100	65-90	35-50	15-25
	12-19	Silty clay, channery silty clay loam, silty clay loam	CL, CH, GC, ML	A-6, A-7	0	0-5	60-100	50-100	45-90	35-85	35-55	10-30
	19-24	Channery silty clay, very channery silty clay loam, channery silty clay loam	CH, ML, CL, GC	A-2, A-6, A-7	0	0-5	50-100	50-100	20-75	20-70	35-55	10-30
	24-26	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
JtA:												
Jimtown---------	0-9	Loam	CL, CL-ML, ML	A-4	0	0	95-100	75-100	60-95	50-80	20-35	4-15
	9-27	Loam, gravelly loam, clay loam	CL, SC-SM, CL-ML, SC	A-2, A-4, A-6	0	0-2	75-100	55-100	45-95	30-75	25-40	4-15
	27-51	Gravelly sandy loam, gravelly loam, very gravelly loamy sand	GC, GM, SM, SC	A-1, A-2, A-4	0	0-5	50-95	40-95	30-70	20-55	15-30	NP-8
	51-80	Stratified very gravelly loamy sand to loam	GM, SM	A-1, A-2, A-4	0	0-5	45-90	30-90	20-75	15-50	15-30	NP-8
JuA:												
Joliet----------	0-14	Silt loam	CL, OL	A-4, A-6	0-1	0-15	90-100	75-100	75-100	60-85	30-40	7-15
	14-16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
KbA:												
Kibbie----------	0-9	Fine sandy loam	CL, ML, SM, SC	A-4, A-6	0	0	100	100	75-95	40-60	0-30	NP-11
	9-42	Silt loam, silty clay loam, loam	CL, SC	A-6, A-4, A-7	0	0	100	100	80-100	35-90	25-45	9-25
	42-80	Stratified fine sand to silt loam	CL, SM, ML, SC	A-2, A-4	0	0	100	100	70-95	30-80	0-30	NP-10

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
MaA:												
Mahoning--------	0-11	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0-1	95-100	90-100	85-100	65-90	25-40	5-14
	11-40	Silty clay loam, clay loam, clay	CH, CL	A-6, A-7	0	0-1	95-100	85-100	85-100	75-95	35-55	14-28
	40-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-2	90-100	85-100	80-95	70-90	30-45	12-22
MaB:												
Mahoning--------	0-11	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0-1	95-100	90-100	85-100	65-90	25-40	5-14
	11-31	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0-1	95-100	85-100	85-100	75-95	35-55	14-28
	31-80	Clay loam, silty clay loam	CL	A-6, A-7	0-1	0-2	90-100	85-100	80-95	70-90	30-45	12-22
MbB:												
Marblehead------	0-6	Loam	CL, SC	A-4	0-5	0-10	90-100	70-100	60-90	40-75	20-30	5-10
	6-8	Fine sandy loam, gravelly loam	CL, SC	A-2, A-4	0-5	0-10	80-100	70-100	50-95	25-75	20-30	5-10
	8-10	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
MeA:												
Mermill---------	0-10	Silty clay loam	CL	A-6, A-7	0	0	95-100	85-100	85-100	75-95	30-45	10-22
	10-24	Clay loam, silty clay loam, loam	CL, SC	A-4, A-7, A-6	0	0	90-100	85-100	70-85	40-75	25-45	8-22
	24-80	Silty clay loam, silty clay, clay loam	CL	A-6, A-7	0	0-2	100	90-100	85-100	70-95	35-50	15-30
MfA:												
Milford---------	0-10	Silty clay loam	CH, CL	A-7	0	0	100	100	90-100	75-95	40-55	20-30
	10-54	Silty clay, silty clay loam, clay loam	CH, CL	A-7	0	0	100	100	90-100	75-100	40-60	20-40
	54-80	Stratified sandy loam to clay	CL, SC	A-6, A-7	0	0	100	100	90-100	45-100	25-50	10-30

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MgA:												
Millgrove-------	0-13	Loam	CL, CL-ML, ML	A-4, A-6	0	0	85-100	75-100	70-95	50-75	20-40	3-16
	13-41	Clay loam, sandy clay loam, loam	CL, SC	A-6	0	0	85-100	70-100	70-95	40-75	25-40	11-26
	41-73	Gravelly loam, very gravelly coarse sandy loam, loam	CL-ML, CL, SC, SC-SM	A-2, A-1, A-4, A-6	0	0-5	60-100	35-85	25-80	15-60	25-40	4-15
	73-80	Stratified fine sand to very fine sandy loam	SC-SM, SC, SM	A-2, A-4	0	0	95-100	90-100	60-85	30-55	15-35	NP-10
MmA:												
Millsdale-------	0-10	Silty clay loam	CL	A-6	0	0	90-100	80-100	75-100	70-95	35-40	15-30
	10-33	Clay, silty clay loam, clay loam	CL, CH	A-6, A-7	0	0-5	85-100	80-100	75-100	60-95	40-60	20-35
	33-35	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
MnA:												
Milton----------	0-10	Silt loam	CL, ML	A-4, A-6	0	0	95-100	90-100	85-100	70-95	25-35	7-15
	10-15	Silty clay loam, clay loam, clay	CL	A-6, A-7	0	0	95-100	90-100	75-100	70-95	35-50	15-30
	15-28	Silty clay, clay, sandy clay loam	CH, CL	A-6, A-7	0-1	0-5	95-100	65-100	60-95	50-90	40-60	20-35
	28-30	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
MnB:												
Milton----------	0-13	Silt loam	CL, ML	A-4, A-6	0	0	95-100	90-100	85-100	70-95	25-35	7-15
	13-27	Silty clay loam, clay loam, clay	CL	A-6, A-7	0	0	95-100	90-100	75-100	70-95	35-50	15-30
	27-29	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
MrA:												
Miner-----------	0-9	Silty clay loam	CL	A-6, A-7	0	0	100	95-100	90-100	85-95	35-45	15-22
	9-53	Silty clay, silty clay loam, clay loam	CH, CL	A-7	0	0	95-100	85-100	80-100	75-95	40-60	20-35
	53-80	Silty clay loam, silty clay, channery clay loam	CH, CL	A-6, A-7	0-1	0-2	85-100	70-100	45-95	40-90	30-52	15-28
MsA:												
Miner-----------	0-9	Silt loam	CL	A-6	0	0	100	95-100	90-100	85-95	25-35	9-15
	9-40	Silty clay, silty clay loam, clay	CH, CL	A-7	0	0	95-100	85-100	80-100	75-95	40-60	20-35
	40-59	Silty clay loam, channery silty clay, clay loam	CH, CL	A-6, A-7	0-1	0-5	85-100	70-100	45-95	40-90	30-52	15-28
	59-61	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
MxA:												
Mitiwanga-------	0-11	Silt loam	CL-ML, ML	A-4	0	0-2	90-100	75-100	70-95	50-80	25-35	7-15
	11-25	Silt loam, clay loam, loam	CL, CL-ML, SM, ML	A-6	0	0-4	80-90	55-90	55-85	40-80	35-45	15-35
	25-27	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
MxB:												
Mitiwanga-------	0-13	Silt loam	CL-ML, ML	A-4	0	0-2	90-100	75-100	70-95	50-80	25-35	7-15
	13-30	Silt loam, clay loam, loam	CL-ML, CL, ML, SM	A-6	0	0-4	80-90	55-90	55-85	40-80	35-45	15-25
	30-32	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
NoA:												
Nolin-----------	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	80-100	25-40	5-18
	10-47	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6, A-7	0	0	100	95-100	85-100	75-100	25-46	5-23
	47-80	Loam, silt loam, gravelly loam	CL-ML, CL, GM, ML	A-4, A-6	0	0-10	50-100	50-100	40-95	35-95	20-35	4-15

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
OaB:												
Oakville--------	0-9	Loamy fine sand	SM	A-2	0	0	100	95-100	55-80	15-35	0-14	NP-4
	9-26	Fine sand, loamy fine sand	SM, SP-SM	A-2	0	0	100	95-100	65-95	10-35	0-14	NP-4
	26-80	Loamy fine sand, sand, fine sand	SM, SP-SM	A-2	0	0	100	95-100	50-80	10-35	0-14	NP-4
OgA:												
Ogontz----------	0-10	Fine sandy loam	CL-ML, ML, SM	A-4	0	0	100	100	75-100	45-70	0-25	NP-6
	10-12	Silt loam, loam	CL, CL-ML, ML	A-4	0	0	100	100	80-97	50-60	0-25	NP-6
	12-36	Silt loam, silty clay loam	CL-ML, CL, ML	A-6, A-4, A-7	0	0	100	100	90-100	75-100	20-45	3-18
	36-80	Stratified very fine sandy loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	85-100	60-95	20-40	3-15
OhB:												
Ogontz----------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	95-100	80-100	25-40	4-15
	9-32	Silt loam, silty clay loam	CL, CL-ML, ML	A-6, A-4, A-7	0	0	100	100	90-100	75-100	20-45	3-18
	32-80	Stratified very fine sandy loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	85-100	60-95	20-40	3-15
OmA:												
Olmstead--------	0-9	Loam	CL, CL-ML, ML	A-4, A-6	0	0	85-100	80-100	75-95	50-75	20-35	3-12
	9-31	Clay loam, loam, gravelly sandy loam	ML, CL, SC, SM	A-4, A-2, A-6	0	0	80-100	65-100	45-80	25-65	25-35	9-15
	31-80	Gravelly sandy loam, sandy clay loam, loamy sand	CL, SM, ML, SC	A-2, A-4, A-6	0	0-5	65-100	50-100	40-70	15-55	20-35	NP-12

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
OpA:												
Orrville--------	0-9	Silt loam	CL-ML, CL, ML	A-4	0	0	100	90-100	85-100	60-80	20-35	3-10
	9-41	Silt loam, loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0-2	95-100	75-100	70-95	50-90	20-40	2-16
	41-69	Stratified gravelly loamy sand to silt loam	ML, CL, SC, SM	A-2, A-1, A-4	0	0-2	95-100	65-100	40-85	15-75	15-35	NP-10
	69-71	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
OrA:												
Orrville--------	0-10	Silt loam	CL, CL-ML, ML	A-4	0	0	100	90-100	85-100	60-80	20-35	3-10
	10-26	Silt loam, silty clay loam	CL, ML, CL-ML	A-4, A-6	0	0-2	95-100	75-100	70-95	50-90	20-40	2-16
	26-69	Stratified gravelly loamy sand to silt loam	ML, CL, SC, SM	A-2, A-1, A-4	0	0-2	95-100	65-100	40-85	15-75	15-35	NP-10
	69-71	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
OsB:												
Oshtemo---------	0-14	Loamy sand	SM, SP-SM	A-1, A-2, A-4	0	0	95-100	55-95	40-80	10-40	0-14	NP-4
	14-41	Sandy loam, sandy clay loam, gravelly coarse sandy loam	SC, SC-SM	A-2, A-4	0	0	80-100	55-95	35-85	15-50	20-30	4-10
	41-80	Stratified sand to very gravelly loamy coarse sand	GP, GP-GM, SP-SM, SP	A-2, A-1, A-3	0	0-5	40-90	35-85	20-60	0-10	0-14	NP-4
PcA:												
Pewamo----------	0-12	Silty clay loam	CL	A-6, A-7	0	0-5	90-100	85-100	75-100	70-95	35-50	15-25
	12-33	Clay loam, clay, silty clay loam	CH, CL	A-7	0	0-5	95-100	85-100	75-100	75-95	40-55	20-35
	33-80	Clay loam, silty clay loam	CL	A-7	0-1	0-5	95-100	75-100	75-100	70-90	40-50	15-25

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
PmA:												
Plumbrook-------	0-11	Fine sandy loam	SC, SC-SM, SM	A-2, A-4	0	0	100	100	70-100	30-55	0-25	NP-10
	11-29	Very fine sandy loam, sandy loam, fine sandy loam	SC, SC-SM, SM	A-4, A-2	0	0	100	100	60-100	30-55	0-30	NP-10
	29-65	Fine sand, loamy fine sand	SC-SM, SP-SM, SM	A-2	0	0	100	100	65-100	10-50	0-20	NP-10
	65-80	Silty clay loam	CH, CL, ML	A-6, A-7	0	0	100	100	95-100	85-100	35-45	15-25
RaA:												
Randolph--------	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	75-85	20-38	4-15
	10-37	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0-1	0-5	80-100	75-100	75-85	70-80	35-60	14-32
	37-39	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
RcA:												
Rawson----------	0-18	Sandy loam	ML, SM	A-2-4, A-4	0	0	90-100	80-100	50-85	25-55	0-30	NP-5
	18-33	Clay loam, loam, gravelly sandy clay loam	GC, CL, SC	A-2-6, A-2-4, A-4, A-6	0	0	65-100	55-95	45-90	25-75	20-40	7-20
	33-80	Clay loam, silty clay, silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	85-100	75-95	35-50	15-30
RcB:												
Rawson----------	0-10	Sandy loam	ML, SM	A-2-4, A-4	0	0	90-100	80-100	50-85	25-55	0-30	NP-5
	10-30	Clay loam, loam, gravelly sandy clay loam	GC, CL, SC	A-2-6, A-4, A-2-4, A-6	0	0	65-100	55-95	45-90	25-75	20-40	7-20
	30-80	Clay loam, silty clay, silty clay loam	CL	A-6, A-7	0	0	90-100	85-100	85-100	75-95	35-50	15-30

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
RgA:												
Rimer-----------	0-11	Loamy fine sand	ML, SM	A-2, A-1, A-4	0	0	100	95-100	45-80	15-55	0-25	NP-7
	11-25	Loamy fine sand, fine sand, loamy sand	SM	A-2, A-4	0	0	100	95-100	75-90	20-40	0-25	NP-7
	25-30	Fine sandy loam, sandy loam	SC-SM, SC, SM	A-4	0	0	100	95-100	60-80	35-50	15-30	4-10
	30-80	Silty clay, clay loam, silty clay loam	CL	A-6, A-7	0	0	100	90-100	85-100	75-95	35-50	15-30
RhA:												
Ritchey---------	0-8	Loam	CL, ML, CL-ML	A-4, A-6	0	0	90-100	85-100	80-100	70-95	25-40	7-15
	8-15	Silty clay, silty clay loam	CL, CH	A-6, A-7	0-1	0-5	90-100	85-100	70-100	50-85	40-65	22-40
	15-17	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
RhB:												
Ritchey---------	0-8	Loam	CL, CL-ML, ML	A-4, A-6	0	0	90-100	85-100	80-100	70-95	25-40	7-15
	8-14	Loam, clay loam, gravelly clay loam	CL, ML	A-6, A-7	0-1	0-5	80-100	75-100	70-100	50-85	33-50	10-20
	14-16	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
RhC:												
Ritchey---------	0-8	Loam	CL, ML, CL-ML	A-4, A-6	0	0	90-100	85-100	80-100	70-95	25-40	7-15
	8-18	Loam, clay loam, gravelly clay loam	CL, ML	A-6, A-7	0-1	0-5	80-100	75-100	70-100	50-85	33-50	10-20
	18-20	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
SaA:												
Sandusky--------	0-11	Loam	CL, CL-ML, ML	A-4, A-6	0	0-5	85-100	75-100	70-95	55-75	20-35	3-15
	11-27	Fine sandy loam, very gravelly coarse sandy loam, loam	SC, SM, SC-SM	A-1, A-2	0	0-5	70-100	50-100	30-60	15-35	15-30	NP-10
	27-80	Silty clay, silty clay loam, silt loam	CH, CL, MH	A-6, A-7	0	0	100	100	90-100	75-100	30-55	10-30

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
SbF:												
Saylesville-----	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	20-35	5-15
	9-40	Clay, silty clay, silty clay loam	CH, CL	A-7	0	0	100	100	95-100	85-100	40-65	22-40
	40-80	Silt loam, silty clay loam	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	30-45	10-25
ShB:												
Shinrock--------	0-14	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	85-100	65-90	25-40	8-16
	14-39	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	95-100	80-95	40-55	20-30
	39-44	Silty clay loam, silt, silt loam	CL, ML	A-6, A-4, A-7	0	0	100	100	90-100	75-100	20-50	2-30
	44-80	Stratified very fine sand to silty clay	CL, SM, ML, SC	A-4, A-6, A-7	0	0	100	100	75-100	40-95	20-50	2-30
SkC2:												
Shinrock--------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	95-100	85-95	35-50	15-25
	8-32	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	95-100	80-95	40-55	20-30
	32-40	Silt loam, silty clay loam, silt	CL, ML	A-4, A-6, A-7	0	0	100	100	90-100	75-100	20-50	2-30
	40-80	Stratified very fine sand to silty clay	ML, CL, SC, SM	A-6, A-4, A-7	0	0	100	100	75-100	40-95	20-50	2-30
SkD2:												
Shinrock--------	0-8	Silty clay loam	CL, ML	A-6, A-7	0	0	100	100	95-100	85-95	35-50	15-25
	8-36	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	95-100	80-95	40-55	20-30
	36-42	Silt loam, silty clay loam, silt	CL, ML	A-4, A-6, A-7	0	0	100	100	90-100	75-100	20-50	2-30
	42-80	Stratified very fine sand to silty clay	CL, ML, SM, SC	A-4, A-7, A-6	0	0	100	100	75-100	40-95	20-50	2-30

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
SpB:												
Spinks----------	0-10	Loamy fine sand	SM, SC-SM, SP-SM	A-1-b, A-2-4	0	0	95-100	90-100	35-90	10-30	0-25	NP-7
	10-15	Loamy sand, sand, fine sand	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-90	5-35	0-25	NP-7
	15-72	Fine sand, loamy fine sand, sand	SC-SM, SM, SP-SM	A-1-b, A-2-4	0	0	95-100	90-100	40-90	10-35	0-25	NP-7
	72-80	Fine sand, sand	SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	75-100	35-90	5-35	0-20	NP-4
SpD:												
Spinks----------	0-13	Loamy fine sand	SM, SC-SM, SP-SM	A-1-b, A-2-4	0	0	95-100	90-100	35-90	10-30	0-25	NP-7
	13-38	Loamy sand, sand, loamy fine sand	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-90	5-35	0-25	NP-7
	38-80	Fine sand, loamy fine sand, sand	SM, SC-SM, SP-SM	A-1-b, A-2-4	0	0	95-100	90-100	40-90	10-35	0-25	NP-7
TgA:												
Tioga-----------	0-5	Loam	ML, SM	A-4	0	0	100	75-100	65-95	40-85	0-30	NP-9
	5-26	Silt loam, loam, gravelly fine sandy loam	ML, GM, SM	A-1, A-2, A-4	0	0	65-100	65-100	35-90	20-80	0-30	NP-9
	26-80	Sandy loam, gravelly loam, very gravelly loamy sand	GW-GM, GM, ML, SM	A-1, A-4, A-2, A-3	0	0-10	35-100	30-100	15-90	5-80	0-25	NP-7
TnA:												
Toledo----------	0-9	Silty clay loam	ML, CL	A-6, A-7	0	0	100	100	90-100	80-100	35-50	15-25
	9-55	Silty clay, clay	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	25-39
	55-80	Silty clay, clay, silty clay loam	CH, ML, CL	A-7	0	0	100	100	95-100	80-100	45-60	20-36
ToA:												
Toledo----------	0-9	Silty clay	CH, MH, CL	A-7	0	0	100	100	95-100	90-100	45-60	25-35
	9-45	Silty clay, clay	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	25-39
	45-80	Silty clay, clay, silty clay loam	CH, ML, CL	A-7	0	0	100	100	95-100	80-100	45-60	20-36

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
TpA:												
Toledo----------	0-8	Silty clay	CH, CL, MH	A-7	0	0	100	100	95-100	80-100	45-60	25-35
	8-46	Silty clay, clay	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	25-39
	46-80	Silty clay, clay	CH, CL, ML	A-7	0	0	100	100	95-100	80-100	45-60	20-36
TuA:												
Tuscola---------	0-9	Fine sandy loam	SC, ML, SM	A-2, A-4	0	0	100	100	60-95	30-65	15-30	2-10
	9-15	Loamy fine sand	SM	A-2, A-4	0	0	100	100	60-85	20-45	0-14	NP-4
	15-46	Silty clay loam, loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	80-95	50-90	20-40	6-20
	46-80	Stratified fine sand to silty clay loam	ML, SM	A-4	0	0	100	100	75-90	40-90	0-40	NP-20
TuB:												
Tuscola---------	0-10	Fine sandy loam	ML, SC, SM	A-2, A-4	0	0	100	100	60-95	30-65	15-30	2-10
	10-16	Loamy fine sand	SM	A-2, A-4	0	0	100	100	60-85	20-45	0-14	NP-4
	16-46	Silty clay loam, silt loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	80-95	50-90	20-40	6-20
	46-80	Stratified fine sand to silty clay loam	ML, SM	A-4	0	0	100	100	75-90	40-90	0-40	NP-20
UcB:												
Udipsamments----	0-80	Varies	---	---	---	---	---	---	---	---	---	---
Spinks----------	0-13	Loamy fine sand	SC-SM, SP-SM, SM	A-1-b, A-2-4	0	0	95-100	90-100	35-90	10-30	0-25	NP-7
	13-34	Loamy sand, sand, fine sand	SC-SM, SM, SP-SM	A-1-b, A-2-4, A-3	0	0	95-100	90-100	35-90	5-35	0-25	NP-7
	34-71	Fine sand, loamy fine sand, sand	SC-SM, SM, SP-SM	A-1-b, A-2-4	0	0	95-100	90-100	40-90	10-35	0-25	NP-7
	71-80	Fine sand, sand	SM, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	75-100	35-90	5-35	0-20	NP-4
UdB:												
Udorthents------	0-80	Varies	---	---	---	---	---	---	---	---	---	---

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
WaB:												
Wakeman---------	0-10	Sandy loam	SM	A-2, A-4	0	0	90-100	75-100	50-80	25-40	0-20	NP-4
	10-27	Sandy loam, loamy sand, channery loam	ML, SM	A-2, A-1, A-4	0	0-5	80-100	60-100	35-85	15-65	0-30	NP-6
	27-31	Sandy loam, loam, channery sandy loam	ML, SM	A-1, A-2, A-4	0	0-5	80-95	60-95	40-85	20-65	10-30	NP-6
	31-33	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
WaC:												
Wakeman---------	0-9	Sandy loam	SM	A-4, A-2	0	0	90-100	75-100	50-80	25-40	0-20	NP-4
	9-25	Gravelly sandy loam, loamy sand, channery sandy loam	ML, SM	A-1, A-2, A-4	0	0-5	80-100	60-100	35-85	15-65	0-30	NP-6
	25-32	Sandy loam, loam, extremely flaggy sandy loam	ML, SM	A-1, A-4, A-2	0	5-80	50-95	40-95	30-85	20-65	0-30	NP-6
	32-34	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
WeA:												
Weyers----------	0-13	Silt loam	CL, CL-ML, SC, ML	A-4, A-6	0	0-5	85-100	75-100	65-95	45-80	20-35	3-15
	13-45	Stratified very gravelly loamy coarse sand to sandy loam	SC-SM, SC, SM, SP-SC	A-1-b, A-2, A-3	0	0-5	70-100	25-100	20-60	5-35	0-30	NP-10
	45-80	Silty clay loam, silty clay	CH, ML, CL, CL-ML	A-6, A-7	0	0	100	100	90-100	70-100	35-55	15-30
ZuC2:												
Zurich----------	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	80-95	25-40	5-20
	9-42	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	60-90	30-45	10-25
	42-80	Stratified very fine sand to silt loam	ML, SC, CL, SM	A-2, A-4, A-6	0	0	100	100	70-100	30-95	20-40	NP-20

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ZuD2:												
Zurich----------	0-9	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	80-95	25-40	5-20
	9-24	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	60-90	30-45	10-25
	24-80	Stratified very fine sand to silt loam	ML, SC, CL, SM	A-2, A-4, A-6	0	0	100	100	70-100	30-95	20-40	NP-20
ZuE2:												
Zurich----------	0-5	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	80-95	25-40	5-20
	5-34	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	60-90	30-45	10-25
	34-80	Stratified very fine sand to silt loam	ML, CL, SC, SM	A-2, A-4, A-6	0	0	100	100	70-100	30-95	20-40	NP-20
ZuF:												
Zurich----------	0-6	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	80-95	25-40	5-20
	6-47	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	60-90	30-45	10-25
	47-80	Stratified very fine sand to silt loam	CL, SM, ML, SC	A-4, A-2, A-6	0	0	100	100	70-100	30-95	20-40	NP-20

Table 19a.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
AaA:										
Adrian----------	0-28	0-0	0.30-0.55	0.20-6.00	0.35-0.45	---	---	---	2	2
	28-80	2-10	1.40-1.75	6.00-20.00	0.03-0.08	Low	.15	.15		
AeA:										
Algiers---------	0-31	15-27	1.20-1.45	0.60-2.00	0.16-0.20	Low	.37	.37	5	6
	31-51	20-35	1.25-1.65	0.60-2.00	0.16-0.20	Low	.37	.37		
	51-80	5-30	1.45-1.75	0.60-2.00	0.08-0.18	Low	.37	.20		
AkA:										
Allis-----------	0-6	27-40	1.10-1.40	0.20-2.00	0.16-0.21	Low	.43	.49	3	6
	6-28	35-60	1.20-1.50	0.00-0.20	0.08-0.14	Moderate	.28	.32		
	28-30	---	---	0.00-0.20	---	---	---	---		
AmD2:										
Amanda----------	0-5	12-27	1.25-1.45	0.60-2.00	0.18-0.24	Low	.37	.43	5	6
	5-27	23-35	1.45-1.65	0.60-2.00	0.15-0.20	Moderate	.37	.43		
	27-34	23-35	1.45-1.70	0.20-0.60	0.13-0.19	Moderate	.37	.49		
	34-80	15-25	1.55-1.75	0.20-0.60	0.08-0.12	Low	.37	.49		
AnG:										
Amanda----------	0-5	12-27	1.25-1.45	0.60-2.00	0.18-0.24	Low	.37	.43	5	6
	5-38	23-35	1.45-1.65	0.60-2.00	0.15-0.20	Moderate	.37	.43		
	38-52	23-35	1.45-1.70	0.20-0.60	0.13-0.19	Moderate	.37	.49		
	52-80	15-25	1.55-1.75	0.20-0.60	0.08-0.12	Low	.37	.49		
Dekalb----------	0-5	10-20	1.20-1.50	6.00-20.00	0.08-0.12	Low	.17	.37	2	8
	5-23	7-18	1.20-1.50	6.00-20.00	0.06-0.12	Low	.17	.49		
	23-25	---	---	0.20-2.00	---	---	---	---		
Rock outcrop.										
BdB:										
Belmore---------	0-9	10-24	1.30-1.45	0.60-2.00	0.14-0.18	Low	.32	.37	5	5
	9-41	15-30	1.35-1.60	2.00-6.00	0.10-0.14	Low	.32	.37		
	41-60	5-15	1.50-1.70	6.00-20.00	0.08-0.12	Low	.24	.43		
BeA:										
Bennington------	0-12	15-25	1.30-1.50	0.60-2.00	0.17-0.21	Low	.43	.43	5	6
	12-34	35-42	1.40-1.70	0.06-0.60	0.10-0.17	Moderate	.32	.37		
	34-80	24-33	1.65-1.80	0.06-0.20	0.07-0.12	Low	.32	.37		
BgA:										
Bennington------	0-9	15-25	1.30-1.50	0.60-2.00	0.17-0.21	Low	.43	.43	5	6
	9-29	35-42	1.40-1.70	0.06-0.60	0.10-0.17	Moderate	.32	.37		
	29-80	24-33	1.65-1.80	0.06-0.20	0.07-0.12	Low	.32	.37		
BgB:										
Bennington------	0-8	15-25	1.30-1.50	0.60-2.00	0.17-0.21	Low	.43	.43	5	6
	8-32	35-42	1.40-1.70	0.06-0.60	0.10-0.17	Moderate	.32	.37		
	32-80	24-33	1.65-1.80	0.06-0.20	0.07-0.12	Low	.32	.37		
BkA:										
Bixler----------	0-10	5-15	1.25-1.40	6.00-20.00	0.10-0.13	Low	.17	.17	5	2
	10-27	5-15	1.25-1.40	6.00-20.00	0.06-0.12	Low	.15	.15		
	27-37	5-25	1.30-1.45	0.60-2.00	0.12-0.18	Low	.37	.37		
	37-80	5-32	1.45-1.75	0.60-2.00	0.08-0.18	Moderate	.37	.37		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
BkB:										
Bixler----------	0-10	5-15	1.25-1.40	6.00-20.00	0.10-0.13	Low	.17	.17	5	2
	10-26	5-15	1.25-1.40	6.00-20.00	0.06-0.12	Low	.15	.15		
	26-80	5-32	1.45-1.75	0.60-2.00	0.08-0.18	Moderate	.37	.37		
BvG:										
Brecksville-----	0-5	15-27	1.30-1.50	0.60-2.00	0.19-0.23	Low	.43	.43	3	6
	5-17	25-35	1.40-1.65	0.06-0.20	0.10-0.18	Moderate	.43	.55		
	17-24	30-45	1.40-1.60	0.06-0.20	0.10-0.18	Moderate	.43	.64		
	24-26	---	---	0.00-0.20	---	---	---	---		
CaA:										
Cardington------	0-16	12-27	1.30-1.50	0.60-2.00	0.18-0.23	Low	.37	.37	5	6
	16-34	35-42	1.45-1.70	0.06-0.60	0.10-0.17	Moderate	.37	.43		
	34-80	24-33	1.65-1.82	0.06-0.20	0.07-0.12	Low	.37	.43		
CaB:										
Cardington------	0-9	12-27	1.30-1.50	0.60-2.00	0.18-0.23	Low	.37	.37	5	6
	9-30	35-42	1.45-1.70	0.06-0.60	0.10-0.17	Moderate	.37	.43		
	30-80	24-33	1.65-1.82	0.06-0.20	0.07-0.12	Low	.37	.43		
CbC2:										
Cardington------	0-6	27-32	1.35-1.55	0.20-0.60	0.17-0.22	Moderate	.37	.37	5	7
	6-29	35-42	1.45-1.70	0.06-0.60	0.10-0.17	Moderate	.37	.43		
	29-80	24-33	1.65-1.82	0.06-0.20	0.07-0.12	Low	.37	.43		
CcA:										
Castalia--------	0-8	12-20	1.20-1.35	6.00-20.00	0.04-0.12	Low	.20	.64	2	8
	8-16	12-20	1.30-1.40	6.00-20.00	0.03-0.13	Low	.10	.43		
	16-24	12-20	1.30-1.40	6.00-20.00	0.02-0.09	Low	.10	.55		
	24-26	---	---	0.00-0.60	---	---	---	---		
CcB:										
Castalia--------	0-8	12-20	1.20-1.35	6.00-20.00	0.04-0.12	Low	.20	.64	2	8
	8-13	12-20	1.30-1.40	6.00-20.00	0.03-0.13	Low	.10	.43		
	13-24	12-20	1.30-1.40	6.00-20.00	0.02-0.09	Low	.10	.55		
	24-26	---	---	0.00-0.60	---	---	---	---		
CcD:										
Castalia--------	0-7	12-20	1.20-1.35	6.00-20.00	0.04-0.12	Low	.20	.64	2	8
	7-16	12-20	1.30-1.40	6.00-20.00	0.03-0.13	Low	.10	.43		
	16-23	12-20	1.30-1.40	6.00-20.00	0.02-0.09	Low	.10	.55		
	23-25	---	---	0.00-0.60	---	---	---	---		
ChB:										
Chili-----------	0-9	7-18	1.30-1.50	0.60-2.00	0.14-0.18	Low	.32	.37	5	5
	9-23	18-32	1.25-1.60	2.00-6.00	0.09-0.16	Low	.32	.55		
	23-41	5-18	1.25-1.60	2.00-6.00	0.06-0.12	Low	.17	.37		
	41-80	5-15	1.25-1.60	2.00-6.00	0.08-0.12	Low	.15	.28		
CmA:										
Colwood---------	0-11	7-26	1.30-1.60	0.60-2.00	0.20-0.24	Low	.28	.28	5	5
	11-53	18-35	1.30-1.60	0.20-0.60	0.17-0.22	Moderate	.43	.43		
	53-80	0-12	1.45-1.65	0.60-2.00	0.08-0.22	Low	.43	.43		
CnA:										
Colwood---------	0-14	7-26	1.30-1.60	0.60-2.00	0.20-0.24	Low	.28	.28	5	5
	14-36	18-35	1.30-1.60	0.20-0.60	0.17-0.22	Moderate	.43	.43		
	36-47	15-35	1.45-1.65	0.20-0.60	0.08-0.22	Moderate	.43	.43		
	47-49	---	---	0.00-0.20	---	---	---	---		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
CoA:										
Condit----------	0-10	18-27	1.30-1.50	0.60-2.00	0.19-0.23	Low	.37	.37	3	6
	10-45	35-45	1.45-1.75	0.06-0.20	0.08-0.16	Moderate	.37	.37		
	45-80	23-36	1.65-1.82	0.06-0.20	0.07-0.12	Moderate	.37	.43		
CtB:										
Conotton--------	0-9	8-16	1.30-1.50	2.00-6.00	0.15-0.18	Low	.24	.32	5	5
	9-39	6-22	1.25-1.60	6.00-20.00	0.06-0.10	Low	.24	.64		
	39-80	2-9	1.20-1.50	6.00-20.00	0.02-0.06	Low	.10	.37		
CuC:										
Conotton--------	0-8	8-16	1.30-1.50	2.00-6.00	0.10-0.14	Low	.24	.43	5	8
	8-40	6-22	1.25-1.60	6.00-20.00	0.06-0.10	Low	.24	.64		
	40-80	2-9	1.20-1.50	6.00-20.00	0.02-0.06	Low	.10	.37		
DbB:										
Dekalb----------	0-9	10-20	1.20-1.50	6.00-20.00	0.08-0.12	Low	.17	.37	2	6
	9-30	7-18	1.20-1.50	6.00-20.00	0.06-0.12	Low	.17	.49		
	30-32	---	---	0.20-2.00	---	---	---	---		
DbD:										
Dekalb----------	0-5	10-20	1.20-1.50	6.00-20.00	0.08-0.12	Low	.17	.37	2	6
	5-21	7-18	1.20-1.50	6.00-20.00	0.06-0.12	Low	.17	.49		
	21-23	---	---	0.20-2.00	---	---	---	---		
DeA:										
Del Rey---------	0-11	15-27	1.30-1.50	0.60-2.00	0.22-0.24	Low	.43	.43	5	6
	11-46	35-45	1.40-1.65	0.06-0.20	0.12-0.20	Moderate	.43	.43		
	46-80	25-35	1.50-1.70	0.06-0.20	0.09-0.11	Moderate	.43	.43		
DuA:										
Dunbridge-------	0-13	4-8	1.40-1.60	6.00-20.00	0.10-0.13	Low	.17	.20	2	2
	13-23	18-30	1.45-1.70	2.00-6.00	0.10-0.18	Low	.32	.55		
	23-29	18-30	1.45-1.70	2.00-6.00	0.02-0.15	Low	.24	.64		
	29-31	---	---	0.00-0.60	---	---	---	---		
DuB:										
Dunbridge-------	0-17	4-8	1.40-1.60	6.00-20.00	0.10-0.13	Low	.17	.20	2	2
	17-31	18-30	1.45-1.70	2.00-6.00	0.10-0.18	Low	.32	.55		
	31-33	---	---	0.00-0.60	---	---	---	---		
EcA:										
Elliott---------	0-15	24-27	1.10-1.30	0.60-2.00	0.22-0.24	Low	.28	.28	4	6
	15-49	35-50	1.30-1.60	0.20-0.60	0.11-0.20	Moderate	.28	.28		
	49-65	27-40	1.60-1.75	0.06-0.60	0.07-0.10	Moderate	.43	.43		
	65-67	---	---	0.00-0.60	---	---	---	---		
EdB:										
Ellsworth-------	0-8	16-25	1.30-1.50	0.60-2.00	0.21-0.24	Low	.43	.43	3	6
	8-30	35-45	1.45-1.70	0.06-0.20	0.12-0.16	Moderate	.32	.32		
	30-80	27-40	1.65-1.85	0.01-0.20	0.06-0.10	Moderate	.32	.37		
EdC2:										
Ellsworth-------	0-7	16-25	1.30-1.50	0.60-2.00	0.21-0.24	Low	.43	.43	3	6
	7-44	35-45	1.45-1.70	0.06-0.20	0.12-0.16	Moderate	.32	.32		
	44-80	27-40	1.65-1.85	0.01-0.20	0.06-0.10	Moderate	.32	.37		
EnA:										
Elnora----------	0-10	2-10	1.20-1.50	2.00-6.00	0.08-0.16	Low	.17	.17	5	2
	10-31	2-5	1.20-1.50	6.00-20.00	0.06-0.10	Low	.17	.17		
	31-80	2-5	1.45-1.65	6.00-20.00	0.03-0.06	Low	.17	.17		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
EoA:										
Elnora----------	0-14	2-10	1.20-1.50	2.00-6.00	0.08-0.16	Low	.17	.17	5	2
	14-45	2-5	1.20-1.50	6.00-20.00	0.06-0.10	Low	.17	.17		
	45-55	2-15	1.45-1.65	2.00-20.00	0.06-0.10	Low	.17	.17		
	55-57	---	---	0.00-0.20	---	---	---	---		
EsA:										
Endoaquents-----	0-80	---	---	---	---	---	---	---	-	---
FnA:										
Fluvaquents-----	0-80	---	---	---	---	---	---	---	-	---
FoB:										
Fox-------------	0-5	10-17	1.35-1.55	0.60-2.00	0.17-0.24	Low	.37	.37	4	5
	5-28	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Moderate	.32	.32		
	28-80	0-2	1.30-1.70	6.00-99.90	0.02-0.07	Low	.10	---		
FrA:										
Fries-----------	0-10	27-40	1.20-1.45	0.20-0.60	0.21-0.23	High	.28	.28	3	7
	10-28	35-55	1.45-1.60	0.06-0.20	0.09-0.13	High	.28	.32		
	28-30	---	---	0.00-0.20	---	---	---	---		
FuA:										
Fulton----------	0-9	27-40	1.35-1.55	0.20-0.60	0.21-0.23	Moderate	.37	.43	5	7
	9-29	45-60	1.40-1.65	0.06-0.20	0.09-0.13	High	.28	.28		
	29-36	35-60	1.40-1.65	0.06-0.20	0.09-0.13	High	.32	.32		
	36-80	35-50	1.45-1.65	0.01-0.20	0.08-0.12	High	.32	.32		
GdA:										
Gilford---------	0-12	10-20	1.50-1.70	2.00-6.00	0.16-0.18	Low	.10	.10	5	3
	12-32	8-17	1.60-1.70	2.00-6.00	0.12-0.14	Low	.20	.20		
	32-44	3-12	1.60-1.80	6.00-20.00	0.04-0.11	Low	.15	.15		
	44-80	2-10	1.65-1.80	6.00-20.00	0.03-0.11	Low	.15	.15		
HdA:										
Harrod----------	0-13	18-27	1.20-1.45	0.60-2.00	0.20-0.24	Low	.28	.28	2	6
	13-28	18-32	1.20-1.50	0.60-2.00	0.14-0.18	Low	.24	.28		
	28-33	5-32	1.20-1.60	0.60-2.00	0.08-0.15	Low	.32	.28		
	33-35	---	---	0.00-0.60	---	---	---	---		
HkA:										
Haskins---------	0-10	12-20	1.30-1.45	0.60-2.00	0.18-0.22	Low	.37	.37	4	5
	10-32	18-35	1.45-1.70	0.60-2.00	0.12-0.16	Low	.37	.43		
	32-80	27-42	1.60-1.80	0.01-0.20	0.06-0.10	Moderate	.37	.37		
HoA:										
Holly-----------	0-8	15-27	1.20-1.40	0.60-2.00	0.20-0.24	Low	.28	.28	5	6
	8-30	18-30	1.20-1.50	0.20-2.00	0.17-0.21	Low	.28	.32		
	30-80	10-27	1.20-1.45	0.60-6.00	0.10-0.20	Low	.28	.32		
HpB:										
Hornell---------	0-7	18-27	1.10-1.40	0.60-2.00	0.16-0.21	Low	.43	.43	3	6
	7-30	35-60	1.20-1.50	0.01-0.20	0.11-0.13	Moderate	.28	.32		
	30-32	---	---	0.00-0.20	---	---	---	---		
HrB:										
Hornell---------	0-8	18-27	1.10-1.40	0.60-2.00	0.16-0.21	Low	.43	.43	3	6
	8-13	35-60	1.20-1.50	0.01-0.20	0.11-0.13	Moderate	.28	.32		
	13-32	35-60	1.30-1.55	0.01-0.20	0.06-0.12	Moderate	.28	.32		
	32-34	---	---	0.00-0.20	---	---	---	---		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
HsA:										
Hornell---------	0-12	27-40	1.10-1.40	0.60-2.00	0.16-0.21	Low	.43	.43	3	7
	12-19	35-60	1.20-1.50	0.01-0.20	0.11-0.13	Moderate	.28	.32		
	19-24	35-60	1.30-1.55	0.01-0.20	0.06-0.12	Moderate	.28	.32		
	24-26	---	---	0.00-0.20	---	---	---	---		
JtA:										
Jimtown---------	0-9	10-24	1.30-1.50	0.60-2.00	0.18-0.22	Low	.32	.37	5	5
	9-27	18-35	1.25-1.60	0.60-2.00	0.10-0.18	Low	.32	.43		
	27-51	8-20	1.25-1.60	0.60-6.00	0.07-0.11	Low	.24	.55		
	51-80	4-16	1.25-1.65	2.00-6.00	0.04-0.10	Low	.10	.24		
JuA:										
Joliet----------	0-14	20-27	1.10-1.30	0.60-2.00	0.17-0.24	Low	.28	.32	1	6
	14-16	---	---	0.00-0.60	---	---	---	---		
KbA:										
Kibbie----------	0-9	2-20	1.40-1.65	0.60-2.00	0.16-0.20	Low	.20	.20	5	3
	9-42	18-35	1.40-1.65	0.60-2.00	0.17-0.22	Low	.43	.43		
	42-80	2-18	1.40-1.70	0.60-2.00	0.12-0.22	Low	.43	.43		
MaA:										
Mahoning--------	0-11	19-27	1.30-1.50	0.60-2.00	0.18-0.22	Low	.43	.43	3	6
	11-40	35-45	1.45-1.70	0.01-0.20	0.13-0.16	Moderate	.32	.32		
	40-80	27-40	1.65-1.85	0.01-0.20	0.06-0.10	Moderate	.32	.37		
MaB:										
Mahoning--------	0-11	19-27	1.30-1.50	0.60-2.00	0.18-0.22	Low	.43	.43	3	6
	11-31	35-45	1.45-1.70	0.01-0.20	0.13-0.16	Moderate	.32	.32		
	31-80	27-40	1.65-1.85	0.01-0.20	0.06-0.10	Moderate	.32	.37		
MbB:										
Marblehead------	0-6	12-20	1.20-1.40	0.60-2.00	0.16-0.22	Low	.28	.32	1	5
	6-8	10-20	1.20-1.40	0.60-2.00	0.16-0.22	Low	.20	.24		
	8-10	---	---	0.00-0.60	---	---	---	---		
MeA:										
Mermill---------	0-10	27-32	1.35-1.55	0.60-2.00	0.19-0.23	Moderate	.37	.37	4	7
	10-24	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Moderate	.28	.32		
	24-80	27-42	1.60-1.80	0.01-0.20	0.06-0.10	Moderate	.28	.28		
MfA:										
Milford---------	0-10	35-40	1.30-1.50	0.60-2.00	0.20-0.23	Moderate	.28	.28	5	4
	10-54	35-42	1.40-1.60	0.20-0.60	0.18-0.20	Moderate	.43	.43		
	54-80	15-45	1.50-1.70	0.20-0.60	0.20-0.22	Moderate	.43	.43		
MgA:										
Millgrove-------	0-13	18-27	1.30-1.50	0.60-2.00	0.18-0.22	Low	.24	.28	5	6
	13-41	18-35	1.40-1.70	0.60-2.00	0.12-0.16	Moderate	.28	.32		
	41-73	5-18	1.25-1.60	0.60-2.00	0.08-0.15	Low	.20	.43		
	73-80	5-18	1.25-1.60	0.60-6.00	0.08-0.12	Low	.28	.32		
MmA:										
Millsdale-------	0-10	27-35	1.30-1.50	0.60-2.00	0.17-0.22	Moderate	.28	.32	2	7
	10-33	35-45	1.40-1.65	0.20-0.60	0.12-0.16	Moderate	.32	.37		
	33-35	---	---	0.00-0.60	---	---	---	---		
MnA:										
Milton----------	0-10	14-27	1.30-1.50	0.60-2.00	0.18-0.23	Low	.37	.37	2	6
	10-15	35-50	1.45-1.65	0.20-2.00	0.12-0.18	Moderate	.32	.37		
	15-28	25-45	1.40-1.70	0.20-2.00	0.12-0.16	Moderate	.32	.37		
	28-30	---	---	0.00-0.60	---	---	---	---		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors			Wind erodi- bility group
							Kw	Kf	T	
	In	Pct	g/cc	In/hr	In/in					
MnB:										
Milton----------	0-13	14-27	1.30-1.50	0.60-2.00	0.18-0.23	Low	.37	.37	2	6
	13-27	35-50	1.45-1.65	0.20-2.00	0.12-0.18	Moderate	.32	.37		
	27-29	---	---	0.00-0.60	---	---	---	---		
MrA:										
Miner-----------	0-9	27-35	1.35-1.55	0.60-2.00	0.19-0.21	Moderate	.32	.32	3	7
	9-53	38-45	1.45-1.70	0.06-0.20	0.12-0.14	Moderate	.32	.32		
	53-80	32-45	1.65-1.75	0.06-0.20	0.05-0.08	Moderate	.32	.37		
MsA:										
Miner-----------	0-9	18-27	1.35-1.55	0.60-2.00	0.19-0.21	Moderate	.32	.32	3	6
	9-40	38-45	1.45-1.70	0.06-0.20	0.12-0.14	Moderate	.32	.32		
	40-59	32-45	1.65-1.75	0.06-0.20	0.05-0.08	Moderate	.32	.37		
	59-61	---	---	0.00-0.20	---	---	---	---		
MxA:										
Mitiwanga-------	0-11	15-26	1.30-1.45	0.60-2.00	0.17-0.21	Low	.32	.37	2	6
	11-25	24-35	1.30-1.60	0.60-2.00	0.13-0.17	Moderate	.32	.43		
	25-27	---	---	0.00-2.00	---	---	---	---		
MxB:										
Mitiwanga-------	0-13	15-26	1.30-1.45	0.60-2.00	0.17-0.21	Low	.32	.37	2	6
	13-30	24-35	1.30-1.60	0.60-2.00	0.13-0.17	Moderate	.32	.43		
	30-32	---	---	0.00-2.00	---	---	---	---		
NoA:										
Nolin-----------	0-10	12-27	1.20-1.40	0.60-2.00	0.18-0.23	Low	.43	.43	5	5
	10-47	18-35	1.25-1.50	0.60-2.00	0.18-0.23	Low	.43	.43		
	47-80	10-27	1.30-1.55	0.60-6.00	0.10-0.23	Low	.43	.43		
OaB:										
Oakville--------	0-9	2-14	1.30-1.55	6.00-20.00	0.09-0.12	Low	.17	.17	5	2
	9-26	0-10	1.30-1.65	6.00-20.00	0.06-0.10	Low	.15	.15		
	26-80	0-10	1.40-1.65	6.00-20.00	0.05-0.07	Low	.15	.15		
OgA:										
Ogontz----------	0-10	10-25	1.35-1.60	0.60-2.00	0.14-0.18	Low	.43	.43	5	3
	10-12	10-25	1.35-1.60	0.60-2.00	0.14-0.18	Low	.43	.43		
	12-36	15-35	1.45-1.65	0.60-2.00	0.13-0.17	Low	.43	.43		
	36-80	12-30	1.35-1.60	0.60-2.00	0.12-0.17	Low	.37	.37		
OhB:										
Ogontz----------	0-9	18-27	1.30-1.45	0.60-2.00	0.16-0.18	Low	.37	.37	5	6
	9-32	15-35	1.45-1.65	0.60-2.00	0.13-0.17	Low	.43	.43		
	32-80	12-30	1.35-1.60	0.60-2.00	0.12-0.17	Low	.37	.37		
OmA:										
Olmstead--------	0-9	10-27	1.25-1.50	0.60-2.00	0.16-0.20	Low	.24	.28	5	5
	9-31	18-27	1.25-1.60	0.60-6.00	0.10-0.14	Low	.24	.28		
	31-80	8-30	1.25-1.60	2.00-6.00	0.06-0.14	Low	.24	.37		
OpA:										
Orrville--------	0-9	12-27	1.25-1.45	0.60-2.00	0.18-0.22	Low	.37	.37	5	6
	9-41	18-30	1.30-1.50	0.60-2.00	0.15-0.19	Low	.37	.43		
	41-69	10-25	1.20-1.40	0.60-6.00	0.08-0.15	Low	.37	.49		
	69-71	---	---	0.00-0.20	---	---	---	---		
OrA:										
Orrville--------	0-10	12-27	1.25-1.45	0.60-2.00	0.18-0.22	Low	.37	.37	5	6
	10-26	18-30	1.30-1.50	0.60-2.00	0.15-0.19	Low	.37	.43		
	26-69	10-25	1.20-1.40	0.60-6.00	0.08-0.15	Low	.37	.49		
	69-71	---	---	0.00-0.20	---	---	---	---		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
OsB:										
Oshtemo---------	0-14	2-10	1.35-1.60	6.00-20.00	0.10-0.12	Low	.17	.17	5	2
	14-41	10-20	1.30-1.60	2.00-6.00	0.12-0.19	Low	.24	.32		
	41-80	0-10	1.30-1.50	20.00-99.90	0.02-0.04	Low	.10	.24		
PcA:										
Pewamo----------	0-12	27-40	1.35-1.55	0.60-2.00	0.20-0.23	Moderate	.28	.28	5	7
	12-33	35-50	1.40-1.70	0.20-0.60	0.12-0.20	Moderate	.32	.32		
	33-80	27-38	1.50-1.70	0.20-0.60	0.14-0.18	Moderate	.37	.37		
PmA:										
Plumbrook-------	0-11	5-15	1.35-1.70	2.00-6.00	0.12-0.15	Low	.20	.20	5	3
	11-29	5-18	1.45-1.70	2.00-6.00	0.12-0.17	Low	.28	.28		
	29-65	2-10	1.50-1.70	2.00-6.00	0.05-0.10	Low	.17	.17		
	65-80	27-35	1.45-1.70	0.20-0.60	0.18-0.20	Moderate	.43	.43		
RaA:										
Randolph--------	0-10	16-27	1.30-1.45	0.60-2.00	0.17-0.22	Low	.37	.37	2	6
	10-37	35-50	1.40-1.65	0.20-0.60	0.13-0.16	Moderate	.37	.43		
	37-39	---	---	0.00-0.60	---	---	---	---		
RcA:										
Rawson----------	0-18	9-18	1.30-1.45	0.60-2.00	0.12-0.18	Low	.24	.28	4	3
	18-33	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.49		
	33-80	27-42	1.60-1.85	0.01-0.20	0.08-0.12	Moderate	.32	.32		
RcB:										
Rawson----------	0-10	9-18	1.30-1.45	0.60-2.00	0.12-0.18	Low	.24	.28	4	3
	10-30	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Low	.32	.49		
	30-80	27-42	1.60-1.85	0.01-0.20	0.08-0.12	Moderate	.32	.32		
RgA:										
Rimer-----------	0-11	3-15	1.40-1.60	6.00-20.00	0.08-0.14	Low	.17	.17	4	2
	11-25	5-15	1.40-1.70	6.00-20.00	0.06-0.12	Low	.17	.17		
	25-30	7-18	1.50-1.70	2.00-6.00	0.12-0.17	Low	.17	.17		
	30-80	27-42	1.50-1.80	0.01-0.20	0.06-0.12	Moderate	.32	.32		
RhA:										
Ritchey---------	0-8	18-27	1.20-1.40	0.60-2.00	0.22-0.24	Low	.37	.37	1	6
	8-15	35-50	1.35-1.60	0.60-2.00	0.14-0.20	Moderate	.37	.37		
	15-17	---	---	0.00-0.60	---	---	---	---		
RhB:										
Ritchey---------	0-8	18-27	1.20-1.40	0.60-2.00	0.22-0.24	Low	.37	.37	1	6
	8-14	20-35	1.35-1.60	0.60-2.00	0.14-0.20	Moderate	.37	.37		
	14-16	---	---	0.00-0.60	---	---	---	---		
RhC:										
Ritchey---------	0-8	18-27	1.20-1.40	0.60-2.00	0.22-0.24	Low	.37	.37	1	6
	8-18	20-35	1.35-1.60	0.60-2.00	0.14-0.20	Moderate	.37	.37		
	18-20	---	---	0.00-0.60	---	---	---	---		
SaA:										
Sandusky--------	0-11	15-25	1.15-1.35	0.60-2.00	0.15-0.20	Low	.37	.43	4	6
	11-27	10-20	1.00-1.30	2.00-6.00	0.08-0.13	Low	.24	.37		
	27-80	25-50	1.45-1.75	0.06-0.60	0.12-0.16	Moderate	.37	.37		
SbF:										
Saylesville-----	0-9	12-25	1.35-1.55	0.60-2.00	0.19-0.24	Low	.37	.37	5	5
	9-40	35-45	1.60-1.70	0.20-0.60	0.08-0.20	Moderate	.37	.37		
	40-80	20-35	1.60-1.70	0.20-0.60	0.18-0.20	Moderate	.37	.37		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in					
ShB:										
Shinrock--------	0-14	18-27	1.30-1.50	0.60-2.00	0.18-0.24	Low	.37	.37	5	6
	14-39	35-45	1.35-1.70	0.20-0.60	0.10-0.16	Moderate	.37	.37		
	39-44	8-40	1.35-1.65	0.20-0.60	0.10-0.14	Moderate	.37	.37		
	44-80	8-40	1.30-1.60	0.20-2.00	0.10-0.14	Moderate	.37	.37		
SkC2:										
Shinrock--------	0-8	27-40	1.35-1.55	0.20-0.60	0.21-0.23	Moderate	.37	.37	5	7
	8-32	35-45	1.35-1.70	0.20-0.60	0.10-0.16	Moderate	.37	.37		
	32-40	8-40	1.35-1.65	0.20-0.60	0.10-0.14	Moderate	.37	.37		
	40-80	8-40	1.30-1.60	0.20-2.00	0.10-0.14	Moderate	.37	.37		
SkD2:										
Shinrock--------	0-8	27-40	1.35-1.55	0.20-0.60	0.21-0.23	Moderate	.37	.37	5	7
	8-36	35-45	1.35-1.70	0.20-0.60	0.10-0.16	Moderate	.37	.37		
	36-42	8-40	1.35-1.65	0.20-0.60	0.10-0.14	Moderate	.37	.37		
	42-80	8-40	1.30-1.60	0.20-2.00	0.10-0.14	Moderate	.37	.37		
SpB:										
Spinks----------	0-10	2-15	1.40-1.70	6.00-20.00	0.08-0.10	Low	.17	.17	5	2
	10-15	0-15	1.40-1.70	2.00-20.00	0.05-0.10	Low	.17	.17		
	15-72	3-15	1.40-1.70	2.00-6.00	0.04-0.08	Low	.17	.17		
	72-80	0-10	1.40-1.70	6.00-20.00	0.04-0.06	Low	.17	.17		
SpD:										
Spinks----------	0-13	2-15	1.40-1.70	6.00-20.00	0.08-0.10	Low	.17	.17	5	2
	13-38	0-15	1.40-1.70	2.00-20.00	0.05-0.10	Low	.17	.17		
	38-80	3-15	1.40-1.70	2.00-6.00	0.04-0.08	Low	.17	.17		
TgA:										
Tioga-----------	0-5	5-18	1.15-1.40	0.60-6.00	0.15-0.21	Low	.37	.37	5	5
	5-26	5-18	1.15-1.45	0.60-6.00	0.07-0.20	Low	.28	.43		
	26-80	3-15	1.25-1.55	0.60-20.00	0.02-0.20	Low	.28	.55		
TnA:										
Toledo----------	0-9	27-40	1.40-1.60	0.20-0.60	0.17-0.23	Moderate	.28	.28	5	7
	9-55	40-60	1.40-1.70	0.06-0.20	0.09-0.13	High	.28	.28		
	55-80	35-60	1.45-1.75	0.06-0.20	0.08-0.12	High	.28	.28		
ToA:										
Toledo----------	0-9	40-55	1.45-1.65	0.20-0.60	0.12-0.14	High	.28	.28	5	4
	9-45	40-60	1.40-1.70	0.06-0.20	0.09-0.13	High	.28	.28		
	45-80	35-60	1.45-1.75	0.06-0.20	0.08-0.12	High	.28	.28		
TpA:										
Toledo----------	0-8	40-55	1.45-1.65	0.20-0.60	0.12-0.14	High	.28	.28	5	4
	8-46	40-60	1.40-1.70	0.06-0.20	0.10-0.13	High	.28	.28		
	46-80	35-60	1.45-1.75	0.06-0.20	0.08-0.12	High	.28	.28		
TuA:										
Tuscola---------	0-9	8-20	1.30-1.65	2.00-6.00	0.13-0.22	Low	.24	.24	5	3
	9-15	5-15	1.25-1.40	6.00-20.00	0.06-0.12	Low	.15	.15		
	15-46	18-35	1.30-1.70	0.60-2.00	0.15-0.20	Moderate	.32	.32		
	46-80	5-35	1.30-1.70	0.60-2.00	0.14-0.18	Low	.32	.32		
TuB:										
Tuscola---------	0-10	8-20	1.30-1.65	2.00-6.00	0.13-0.22	Low	.24	.24	5	3
	10-16	5-15	1.25-1.40	6.00-20.00	0.06-0.12	Low	.15	.15		
	16-46	18-35	1.30-1.70	0.60-2.00	0.15-0.20	Moderate	.32	.32		
	46-80	5-35	1.30-1.70	0.60-2.00	0.14-0.18	Low	.32	.32		

Table 19a.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Shrink-swell potential	Erosion factors Kw	Kf	T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in					
UcB:										
Udipsamments----	0-80	---	---	---	---	---	---	---	-	---
Spinks----------	0-13	2-15	1.40-1.70	6.00-20.00	0.08-0.10	Low	.17	.17	5	2
	13-34	0-15	1.40-1.70	2.00-20.00	0.05-0.10	Low	.17	.17		
	34-71	3-15	1.40-1.70	2.00-6.00	0.04-0.08	Low	.17	.17		
	71-80	0-10	1.40-1.70	6.00-20.00	0.04-0.06	Low	.17	.17		
UdB:										
Udorthents------	0-80	---	---	---	---	---	---	---	-	---
WaB:										
Wakeman---------	0-10	8-18	1.10-1.40	2.00-6.00	0.13-0.15	Low	.28	.37	2	3
	10-27	5-18	1.20-1.50	2.00-6.00	0.09-0.18	Low	.15	.24		
	27-31	5-18	1.20-1.50	2.00-6.00	0.09-0.18	Low	.20	.32		
	31-33	---	---	0.00-2.00	---	---	---	---		
WaC:										
Wakeman---------	0-9	8-18	1.10-1.40	2.00-6.00	0.13-0.15	Low	.28	.37	2	3
	9-25	5-18	1.20-1.50	2.00-6.00	0.09-0.18	Low	.15	.24		
	25-32	5-18	1.20-1.50	2.00-6.00	0.09-0.18	Low	.20	.32		
	32-34	---	---	0.00-2.00	---	---	---	---		
WeA:										
Weyers----------	0-13	15-25	1.05-1.25	2.00-6.00	0.15-0.20	Low	.28	.32	5	6
	13-45	5-18	1.00-1.30	2.00-6.00	0.07-0.14	Low	.20	.32		
	45-80	27-45	1.45-1.75	0.06-0.60	0.14-0.18	Moderate	.37	.37		
ZuC2:										
Zurich----------	0-9	20-27	1.15-1.35	0.60-2.00	0.22-0.24	Low	.37	.37	5	6
	9-42	25-35	1.35-1.55	0.60-2.00	0.18-0.22	Moderate	.37	.37		
	42-80	5-25	1.25-1.55	0.60-6.00	0.14-0.22	Low	.37	.43		
ZuD2:										
Zurich----------	0-9	20-27	1.15-1.35	0.60-2.00	0.22-0.24	Low	.37	.37	5	6
	9-24	25-35	1.35-1.55	0.60-2.00	0.18-0.22	Moderate	.37	.37		
	24-80	5-25	1.25-1.55	0.60-6.00	0.14-0.22	Low	.37	.43		
ZuE2:										
Zurich----------	0-5	20-27	1.15-1.35	0.60-2.00	0.22-0.24	Low	.37	.37	5	6
	5-34	25-35	1.35-1.55	0.60-2.00	0.18-0.22	Moderate	.37	.37		
	34-80	5-25	1.25-1.55	0.60-6.00	0.14-0.22	Low	.37	.43		
ZuF:										
Zurich----------	0-6	20-27	1.15-1.35	0.60-2.00	0.22-0.24	Low	.37	.37	5	6
	6-47	25-35	1.35-1.55	0.60-2.00	0.18-0.22	Moderate	.37	.37		
	47-80	5-25	1.25-1.55	0.60-6.00	0.14-0.22	Low	.37	.43		

Table 19b.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
AaA:					
Adrian----------	0-28	4.5-7.3	55-75	110-150	0
	28-80	5.6-8.4	0.0-2.0	1.0-2.0	0-5
AeA:					
Algiers---------	0-31	5.6-7.3	2.0-4.0	10-24	0
	31-51	6.1-7.8	0.5-1.0	10-22	0-5
	51-80	6.1-8.4	0.1-0.5	2.0-8.0	0-10
AkA:					
Allis-----------	0-6	3.5-6.0	2.0-4.0	15-32	0
	6-28	3.5-6.0	0.0-1.0	14-38	0
	28-30	---	---	---	---
AmD2:					
Amanda----------	0-5	5.1-7.3	0.5-2.0	10-20	0
	5-27	4.5-5.5	0.0-1.0	10-20	0
	27-34	5.6-7.8	0.0-0.5	10-20	0-10
	34-80	7.4-8.4	0.0-0.5	6.0-16	0-22
AnG:					
Amanda----------	0-5	5.1-7.3	1.0-3.0	10-20	0
	5-38	4.5-5.5	0.0-1.0	10-20	0
	38-52	5.6-7.8	0.0-0.5	10-20	0-10
	52-80	7.4-8.4	0.0-0.5	6.0-16	0-22
Dekalb----------	0-5	3.6-6.5	2.0-4.0	6.0-16	0
	5-23	3.6-6.5	0.5-1.0	3.0-9.0	0
	23-25	---	---	---	---
Rock outcrop.					
BdB:					
Belmore---------	0-9	5.6-7.3	1.0-3.0	7.0-18	0
	9-41	4.5-7.3	0.5-1.0	8.0-18	0
	41-60	7.4-8.4	0.0-0.5	3.0-10	0-35
BeA:					
Bennington------	0-12	4.5-7.3	2.0-4.0	12-20	0
	12-34	4.5-7.8	0.5-1.0	20-26	0-5
	34-80	7.4-8.4	0.0-0.5	9.0-20	10-22
BgA:					
Bennington------	0-9	4.5-7.3	2.0-4.0	12-20	0
	9-29	4.5-7.8	0.5-1.0	20-26	0-5
	29-80	7.4-8.4	0.0-0.5	9.0-20	10-22
BgB:					
Bennington------	0-8	4.5-7.3	2.0-4.0	12-20	0
	8-32	4.5-7.8	0.5-1.0	20-26	0-5
	32-80	7.4-8.4	0.0-0.5	9.0-20	10-22
BkA:					
Bixler----------	0-10	5.6-7.3	0.5-3.0	3.0-15	0
	10-27	5.6-7.3	0.3-1.0	2.0-9.0	0
	27-37	5.6-7.3	0.1-0.5	2.0-13	0
	37-80	6.1-8.4	0.0-0.3	2.0-19	0-30

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
BkB:					
Bixler----------	0-10	5.6-7.3	0.5-3.0	3.0-15	0
	10-26	5.6-7.3	0.3-1.0	2.0-9.0	0
	26-80	6.1-8.4	0.0-0.3	2.0-19	0-30
BvG:					
Brecksville-----	0-5	3.6-5.5	1.0-3.0	8.0-22	0
	5-17	3.6-5.5	0.0-1.0	11-21	0
	17-24	3.6-5.5	0.0-0.5	12-27	0
	24-26	---	---	---	---
CaA:					
Cardington------	0-16	4.5-7.3	1.0-3.0	12-18	0
	16-34	4.5-7.8	0.5-1.0	18-24	0-10
	34-80	7.4-8.4	0.0-0.5	9.0-20	8-22
CaB:					
Cardington------	0-9	4.5-7.3	1.0-3.0	12-18	0
	9-30	4.5-7.8	0.5-1.0	18-24	0-10
	30-80	7.4-8.4	0.0-0.5	9.0-20	8-22
CbC2:					
Cardington------	0-6	4.5-7.3	0.5-2.0	12-24	0
	6-29	4.5-7.8	0.5-1.0	18-24	0-10
	29-80	7.4-8.4	0.0-0.5	9.0-20	8-22
CcA:					
Castalia--------	0-8	7.4-8.4	3.0-6.0	12-24	5-20
	8-16	7.4-8.4	0.5-2.0	5.0-12	40-60
	16-24	7.4-8.4	0.0-0.5	5.0-12	50-70
	24-26	---	---	---	---
CcB:					
Castalia--------	0-8	7.4-8.4	3.0-6.0	12-24	5-20
	8-13	7.4-8.4	0.5-2.0	5.0-12	40-60
	13-24	7.4-8.4	0.0-0.5	5.0-12	50-70
	24-26	---	---	---	---
CcD:					
Castalia--------	0-7	7.4-8.4	3.0-6.0	12-24	5-20
	7-16	7.4-8.4	0.5-2.0	5.0-12	40-60
	16-23	7.4-8.4	0.0-0.5	5.0-12	50-70
	23-25	---	---	---	---
ChB:					
Chili-----------	0-9	4.5-7.3	1.0-3.0	5.0-13	0
	9-23	4.5-6.5	0.3-1.0	8.0-16	0
	23-41	5.1-6.5	0.2-0.5	6.0-16	0
	41-80	5.1-7.8	0.1-0.3	4.0-12	0-5
CmA:					
Colwood---------	0-11	6.1-7.8	3.0-8.0	10-25	0
	11-53	6.1-7.8	0.5-1.0	3.0-15	0-5
	53-80	7.4-8.4	0.0-0.5	1.0-5.0	5-20
CnA:					
Colwood---------	0-14	6.1-7.8	3.0-8.0	10-25	0
	14-36	6.1-7.8	0.5-2.0	3.0-15	0
	36-47	6.1-7.8	0.0-0.5	3.0-14	0-5
	47-49	---	---	---	---

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
CoA:					
Condit----------	0-10	4.5-7.3	2.0-4.0	14-30	0
	10-45	4.5-7.8	0.5-2.0	14-30	0-5
	45-80	7.4-8.4	0.0-0.5	9.0-22	5-20
CtB:					
Conotton--------	0-9	4.5-6.5	0.5-3.0	8.0-16	0
	9-39	4.5-7.3	0.5-1.0	3.0-12	0
	39-80	5.6-7.8	0.1-0.5	2.0-10	0-10
CuC:					
Conotton--------	0-8	4.5-6.5	0.5-3.0	8.0-16	0
	8-40	4.5-7.3	0.5-1.0	3.0-12	0
	40-80	5.6-7.8	0.1-0.5	2.0-10	0-10
DbB:					
Dekalb----------	0-9	3.6-6.5	2.0-4.0	6.0-16	0
	9-30	3.6-5.5	0.5-1.0	3.0-9.0	0
	30-32	---	---	---	---
DbD:					
Dekalb----------	0-5	3.6-6.5	2.0-4.0	6.0-16	0
	5-21	3.6-5.5	0.5-1.0	3.0-9.0	0
	21-23	---	---	---	---
DeA:					
Del Rey---------	0-11	4.5-7.3	2.0-3.0	12-20	0
	11-46	4.5-8.4	0.0-1.0	18-24	0-10
	46-80	7.9-8.4	0.0-0.5	12-18	5-40
DuA:					
Dunbridge-------	0-13	6.1-7.8	2.0-4.0	6.0-13	0
	13-23	6.1-7.8	0.5-1.0	7.0-18	0-15
	23-29	6.1-8.4	0.1-0.5	7.0-18	0-30
	29-31	---	---	---	---
DuB:					
Dunbridge-------	0-17	6.1-7.8	2.0-4.0	6.0-13	0
	17-31	6.1-7.8	0.5-1.0	7.0-18	0-15
	31-33	---	---	---	---
EcA:					
Elliott---------	0-15	5.6-7.3	3.0-5.0	20-24	0
	15-49	5.6-7.8	0.0-1.0	17-27	0-5
	49-65	7.4-8.4	0.0-0.2	14-20	10-40
	65-67	---	---	---	---
EdB:					
Ellsworth-------	0-8	4.5-7.3	1.0-3.0	10-20	0
	8-30	4.5-7.8	0.5-1.0	15-25	0-5
	30-80	6.6-8.4	0.1-0.5	11-26	3-15
EdC2:					
Ellsworth-------	0-7	4.5-7.3	0.5-2.0	10-22	0
	7-44	4.5-7.8	0.5-1.0	15-25	0-5
	44-80	6.6-8.4	0.1-0.5	11-26	3-15
EnA:					
Elnora----------	0-10	3.6-6.5	1.0-3.0	5.0-18	0
	10-31	3.6-6.5	0.5-1.0	2.0-5.0	0
	31-80	5.1-7.3	0.0-0.5	1.0-4.0	0

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
EoA:					
Elnora----------	0-14	3.6-6.5	1.0-3.0	5.0-18	0
	14-45	3.6-6.5	0.5-1.0	2.0-4.0	0
	45-55	5.1-7.3	0.0-0.5	1.0-10	0
	55-57	---	---	---	---
EsA:					
Endoaquents-----	0-80	---	---	---	---
FnA:					
Fluvaquents-----	0-80	---	---	---	---
FoB:					
Fox-------------	0-5	5.1-7.3	1.0-3.0	4.0-20	0
	5-28	5.1-8.4	0.0-0.5	4.0-30	0-45
	28-80	7.4-8.4	0.0-0.5	0.0-3.0	5-45
FrA:					
Fries-----------	0-10	5.1-6.5	4.0-8.0	21-30	0
	10-28	5.1-6.5	0.5-2.0	18-30	0
	28-30	---	---	---	---
FuA:					
Fulton----------	0-9	5.1-7.3	2.0-3.0	22-30	0
	9-29	5.1-7.3	0.5-1.0	22-36	0
	29-36	6.1-7.8	0.0-0.5	14-36	0-20
	36-80	7.4-8.4	0.0-0.3	14-30	10-30
GdA:					
Gilford---------	0-12	5.6-7.3	3.0-6.0	8.0-20	0
	12-32	5.6-7.3	0.0-1.0	4.0-13	0
	32-44	6.1-7.3	0.0-0.5	1.0-9.0	0
	44-80	6.6-8.4	0.0-0.5	1.0-6.0	0-30
HdA:					
Harrod----------	0-13	6.6-7.8	3.0-6.0	13-28	0-5
	13-28	6.6-8.4	1.0-3.0	10-26	0-5
	28-33	6.6-8.4	0.5-1.0	3.0-21	5-15
	33-35	---	---	---	---
HkA:					
Haskins---------	0-10	4.5-7.3	1.0-3.0	6.0-18	0
	10-32	5.1-7.3	0.0-0.5	7.0-21	0
	32-80	6.1-8.4	0.0-0.5	14-33	0-30
HoA:					
Holly-----------	0-8	5.6-7.3	2.0-5.0	10-24	0
	8-30	5.1-7.3	0.5-2.0	5.0-14	0
	30-80	5.1-7.8	0.5-2.0	5.0-12	0-5
HpB:					
Hornell---------	0-7	3.6-5.5	2.0-4.0	10-35	0
	7-30	4.5-5.5	0.0-1.0	20-32	0
	30-32	---	---	---	---
HrB:					
Hornell---------	0-8	3.6-5.5	2.0-4.0	10-35	0
	8-13	4.5-5.5	0.0-1.0	20-32	0
	13-32	4.5-5.5	0.0-0.5	20-32	0
	32-34	---	---	---	---

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
HsA:					
Hornell---------	0-12	3.6-5.5	2.0-4.0	10-35	0
	12-19	4.5-5.5	0.0-1.0	20-32	0
	19-24	4.5-5.5	0.0-0.5	20-32	0
	24-26	---	---	---	---
JtA:					
Jimtown---------	0-9	4.5-7.3	2.0-3.0	10-18	0
	9-27	4.5-6.5	0.5-1.0	8.0-15	0
	27-51	5.1-6.5	0.2-0.5	5.0-15	0
	51-80	5.1-8.4	0.1-0.3	6.0-12	0-10
JuA:					
Joliet----------	0-14	6.1-8.4	4.0-5.0	18-26	0-20
	14-16	---	---	---	---
KbA:					
Kibbie----------	0-9	5.6-7.3	2.0-4.0	5.0-20	0
	9-42	5.6-7.8	0.0-0.5	5.0-20	0-5
	42-80	7.4-8.4	0.0-0.5	1.0-10	10-35
MaA:					
Mahoning--------	0-11	4.5-7.3	2.0-4.0	12-20	0
	11-40	4.5-7.8	0.5-1.0	18-25	0-5
	40-80	7.4-8.4	0.1-0.5	11-26	3-15
MaB:					
Mahoning--------	0-11	4.5-7.3	2.0-4.0	12-20	0
	11-31	4.5-7.8	0.5-1.0	18-25	0-5
	31-80	7.4-8.4	0.1-0.5	11-26	3-15
MbB:					
Marblehead------	0-6	6.1-8.4	3.0-8.0	0.0-7.0	0-25
	6-8	6.1-8.4	3.0-8.0	6.0-21	0-55
	8-10	---	---	---	---
MeA:					
Mermill---------	0-10	5.6-7.3	3.0-6.0	13-26	0
	10-24	5.6-7.8	0.5-1.0	7.0-21	0-5
	24-80	6.6-8.4	0.0-0.5	14-33	0-30
MfA:					
Milford---------	0-10	5.6-7.3	5.0-6.0	24-36	0
	10-54	5.6-7.8	0.5-1.0	15-27	0-5
	54-80	6.6-8.4	0.0-0.5	8.0-19	0-15
MgA:					
Millgrove-------	0-13	5.6-7.3	3.0-8.0	15-30	0
	13-41	6.1-7.8	0.5-1.0	10-18	0
	41-73	6.1-7.8	0.5-1.0	3.0-10	0-5
	73-80	6.1-8.4	0.0-0.5	3.0-10	0-25
MmA:					
Millsdale-------	0-10	6.1-7.3	4.0-7.0	20-36	0
	10-33	6.1-8.4	0.5-2.0	15-30	0-10
	33-35	---	---	---	---
MnA:					
Milton----------	0-10	4.5-7.3	1.0-3.0	10-22	0
	10-15	4.5-7.8	0.5-1.0	16-30	0-5
	15-28	5.6-8.4	0.0-0.5	10-27	0-15
	28-30	---	---	---	---

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
MnB:					
Milton----------	0-13	4.5-7.3	1.0-3.0	10-22	0
	13-27	4.5-7.8	0.5-1.0	16-30	0-5
	27-29	---	---	---	---
MrA:					
Miner-----------	0-9	6.1-7.3	3.0-6.0	20-30	0
	9-53	5.6-7.3	0.5-1.0	20-28	0
	53-80	6.1-8.4	0.1-0.5	13-20	0-10
MsA:					
Miner-----------	0-9	5.1-7.3	3.0-6.0	17-25	0
	9-40	4.5-7.3	0.5-1.0	20-28	0
	40-59	5.1-8.4	0.1-0.5	13-28	0-10
	59-61	---	---	---	---
MxA:					
Mitiwanga-------	0-11	4.5-6.5	2.0-4.0	10-20	0
	11-25	4.5-6.0	0.5-1.0	12-18	0
	25-27	---	---	---	---
MxB:					
Mitiwanga-------	0-13	4.5-6.5	2.0-4.0	10-20	0
	13-30	4.5-6.0	0.5-1.0	12-18	0
	30-32	---	---	---	---
NoA:					
Nolin-----------	0-10	5.6-8.4	2.0-4.0	6.0-20	0-5
	10-47	5.6-8.4	0.3-2.0	6.0-20	0-10
	47-80	5.1-8.4	0.3-2.0	6.0-18	0-10
OaB:					
Oakville--------	0-9	4.5-7.3	0.5-2.0	2.0-10	0
	9-26	4.5-7.3	0.0-0.5	1.0-2.0	0
	26-80	5.6-7.3	0.0-0.5	1.0-2.0	0
OgA:					
Ogontz----------	0-10	5.6-7.3	1.0-3.0	5.0-17	0
	10-12	5.6-7.3	0.1-0.5	4.0-15	0
	12-36	5.6-7.3	0.1-0.5	6.0-21	0
	36-80	7.4-8.4	0.0-0.1	5.0-18	10-25
OhB:					
Ogontz----------	0-9	5.6-7.3	1.0-3.0	9.0-22	0
	9-32	5.6-7.3	0.1-0.5	6.0-21	0
	32-80	7.4-8.4	0.0-0.1	5.0-18	10-25
OmA:					
Olmstead--------	0-9	4.5-6.5	4.0-8.0	15-30	0
	9-31	4.5-7.8	0.5-1.0	8.0-16	0
	31-80	5.1-7.8	0.1-0.3	4.0-15	0-10
OpA:					
Orrville--------	0-9	5.1-7.3	2.0-4.0	10-20	0
	9-41	5.1-6.5	0.5-1.0	10-16	0
	41-69	5.1-7.3	0.1-0.3	5.0-12	0
	69-71	---	---	---	---
OrA:					
Orrville--------	0-10	5.1-7.3	2.0-4.0	10-20	0
	10-26	5.1-6.5	0.5-1.0	10-16	0
	26-69	5.1-7.3	0.1-0.3	5.0-12	0
	69-71	---	---	---	---

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
OsB:					
Oshtemo---------	0-14	5.1-6.5	0.5-3.0	2.0-12	0
	14-41	5.1-7.3	0.1-0.5	4.0-10	0
	41-80	7.4-8.4	0.0-0.5	1.0-2.0	10-25
PcA:					
Pewamo----------	0-12	6.1-7.3	3.0-12	10-40	0
	12-33	5.6-7.8	0.5-2.0	10-20	0-5
	33-80	7.4-8.4	0.0-1.0	5.0-15	15-30
PmA:					
Plumbrook-------	0-11	5.1-7.3	2.0-4.0	9.0-17	0
	11-29	5.6-7.8	0.5-1.0	7.0-13	0-5
	29-65	6.6-8.4	0.1-0.5	1.0-7.0	0-20
	65-80	7.4-8.4	0.0-0.1	11-21	0-20
RaA:					
Randolph--------	0-10	5.1-7.3	1.0-3.0	8.0-22	0
	10-37	5.1-8.4	0.0-0.5	14-30	0-15
	37-39	---	---	---	---
RcA:					
Rawson----------	0-18	4.5-7.3	1.0-3.0	5.0-15	0
	18-33	4.5-7.8	0.5-1.0	10-20	0-5
	33-80	5.1-8.4	0.0-0.5	14-34	0-25
RcB:					
Rawson----------	0-10	4.5-7.3	1.0-3.0	5.0-15	0
	10-30	4.5-7.8	0.5-1.0	10-20	0-5
	30-80	5.1-8.4	0.0-0.5	14-34	0-25
RgA:					
Rimer-----------	0-11	5.1-7.3	1.0-3.0	3.0-15	0
	11-25	5.1-7.3	0.5-1.0	2.0-9.0	0
	25-30	5.1-7.3	0.0-0.5	3.0-11	0
	30-80	6.1-8.4	0.0-0.5	14-34	0-30
RhA:					
Ritchey---------	0-8	5.6-7.8	1.0-3.0	13-22	0
	8-15	6.6-8.4	0.5-1.0	14-34	0-20
	15-17	---	---	---	---
RhB:					
Ritchey---------	0-8	5.6-7.8	1.0-3.0	13-22	0
	8-14	6.6-8.4	0.5-1.0	17-23	0-20
	14-16	---	---	---	---
RhC:					
Ritchey---------	0-8	5.6-7.8	1.0-3.0	13-22	0
	8-18	6.6-8.4	0.5-1.0	17-23	0-20
	18-20	---	---	---	---
SaA:					
Sandusky--------	0-11	7.4-8.4	3.0-8.0	26-45	60-110
	11-27	7.9-8.4	0.5-2.0	4.0-12	60-110
	27-80	7.4-8.4	0.1-0.5	10-30	10-30
SbF:					
Saylesville-----	0-9	5.1-7.8	1.0-3.0	7.0-21	0-5
	9-40	5.1-7.8	0.5-1.0	15-30	0-5
	40-80	7.4-8.4	0.0-0.5	8.0-22	5-22

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
ShB:					
Shinrock--------	0-14	5.6-7.3	1.0-3.0	8.0-22	0
	14-39	5.1-7.8	0.5-1.0	15-29	0-5
	39-44	6.6-8.4	0.0-0.5	3.0-24	0-15
	44-80	7.4-8.4	0.0-0.5	3.0-24	5-22
SkC2:					
Shinrock--------	0-8	5.6-7.3	0.5-2.0	13-30	0
	8-32	5.1-7.8	0.5-1.0	15-29	0-5
	32-40	6.6-8.4	0.0-0.5	3.0-24	0-15
	40-80	7.4-8.4	0.0-0.5	3.0-24	5-22
SkD2:					
Shinrock--------	0-8	5.1-7.3	0.5-2.0	13-30	0
	8-36	5.1-7.8	0.5-1.0	15-29	0-5
	36-42	6.6-8.4	0.0-0.5	3.0-24	0-15
	42-80	7.4-8.4	0.0-0.5	3.0-24	5-22
SpB:					
Spinks----------	0-10	5.1-7.3	0.5-3.0	3.0-20	0
	10-15	5.6-7.3	0.0-0.5	1.0-4.0	0
	15-72	5.6-7.8	0.0-0.5	1.0-6.0	0-5
	72-80	6.6-8.4	0.0-0.5	0.0-2.0	0-10
SpD:					
Spinks----------	0-13	5.1-7.3	0.5-3.0	3.0-20	0
	13-38	5.6-7.3	0.0-0.5	1.0-4.0	0
	38-80	5.6-7.8	0.0-0.5	1.0-6.0	0-5
TgA:					
Tioga-----------	0-5	5.1-7.3	2.0-4.0	12-28	0
	5-26	5.1-7.3	0.0-1.0	3.0-15	0
	26-80	5.6-7.8	0.0-1.0	3.0-15	0-5
TnA:					
Toledo----------	0-9	7.4-8.4	3.0-6.0	17-36	5-20
	9-55	6.1-7.8	0.5-1.0	16-36	0-5
	55-80	7.4-8.4	0.0-0.5	14-37	8-22
ToA:					
Toledo----------	0-9	5.6-7.3	3.0-6.0	22-45	0
	9-45	6.1-7.8	0.5-1.0	16-36	0-5
	45-80	7.4-8.4	0.0-0.5	14-37	8-22
TpA:					
Toledo----------	0-8	5.6-7.3	4.0-8.0	22-45	0
	8-46	5.6-7.8	0.5-2.0	16-36	0-5
	46-80	7.4-8.4	0.0-0.5	14-37	8-22
TuA:					
Tuscola---------	0-9	5.6-7.3	1.0-3.0	4.0-15	0
	9-15	5.6-7.3	0.3-1.0	2.0-11	0
	15-46	5.6-7.3	0.0-0.5	3.0-15	0
	46-80	6.6-8.4	0.0-0.5	1.0-20	0-25
TuB:					
Tuscola---------	0-10	5.6-7.3	1.0-3.0	4.0-15	0
	10-16	5.6-7.3	0.3-1.0	2.0-11	0
	16-46	5.6-7.3	0.0-0.5	3.0-15	0
	46-80	6.6-8.4	0.0-0.5	1.0-20	0-25

Table 19b.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate equivalent
	In	pH	Pct	meq/100 g	Pct
UcB:					
Udipsamments----	0-80	---	---	---	---
Spinks----------	0-13	5.1-7.3	0.5-3.0	3.0-20	0
	13-34	5.6-7.3	0.0-0.5	1.0-4.0	0
	34-71	5.6-7.8	0.0-0.5	1.0-6.0	0-5
	71-80	6.6-8.4	0.0-0.5	0.0-2.0	0-10
UdB:					
Udorthents------	0-80	---	---	---	---
WaB:					
Wakeman---------	0-10	5.1-7.3	1.0-2.0	4.0-16	0
	10-27	5.1-7.3	0.0-0.5	2.0-11	0
	27-31	5.1-7.3	0.0-0.1	2.0-11	0
	31-33	---	---	---	---
WaC:					
Wakeman---------	0-9	5.1-7.3	1.0-2.0	4.0-16	0
	9-25	5.1-7.3	0.0-0.5	2.0-11	0
	25-32	5.1-7.3	0.0-0.1	2.0-11	0
	32-34	---	---	---	---
WeA:					
Weyers----------	0-13	7.4-8.4	3.0-8.0	14-39	80-110
	13-45	7.4-8.4	0.5-2.0	4.0-14	80-110
	45-80	7.4-8.4	0.1-0.5	8.0-27	10-30
ZuC2:					
Zurich----------	0-9	5.1-7.3	0.5-2.0	13-22	0
	9-42	4.5-7.8	0.2-0.5	15-22	0-5
	42-80	7.4-8.4	0.2-0.5	3.0-16	5-30
ZuD2:					
Zurich----------	0-9	5.1-7.3	0.5-2.0	13-22	0
	9-24	4.5-7.8	0.2-0.5	15-22	0-5
	24-80	7.4-8.4	0.2-0.5	3.0-16	5-30
ZuE2:					
Zurich----------	0-5	5.1-7.3	0.5-2.0	13-22	0
	5-34	4.5-7.8	0.2-0.5	15-22	0-5
	34-80	7.4-8.4	0.2-0.5	3.0-16	5-30
ZuF:					
Zurich----------	0-6	6.1-7.3	1.0-3.0	13-22	0
	6-47	4.5-7.8	0.2-0.5	15-22	0-5
	47-80	7.4-8.4	0.2-0.5	3.0-16	5-30

Table 20.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer		Total subsidence	Potential for frost action	Risk of corrosion	
	Kind	Depth to top			Uncoated steel	Concrete
		In	In			
AaA:						
Adrian-----------------	---	---	29-33	High	High	Moderate
AeA:						
Algiers----------------	---	---	---	High	High	Low
AkA:						
Allis------------------	Bedrock (paralithic)	20-40	---	Moderate	High	High
AmD2:						
Amanda-----------------	---	---	---	Moderate	Moderate	Moderate
AnG:						
Amanda-----------------	---	---	---	Moderate	Moderate	Moderate
Dekalb-----------------	Bedrock (lithic)	20-40	---	Low	Low	High
Rock outcrop-----------	Bedrock (lithic)	0-0	---	---	---	---
BdB:						
Belmore----------------	---	---	---	Low	Moderate	Moderate
BeA:						
Bennington-------------	---	---	---	High	High	Moderate
BgA:						
Bennington-------------	---	---	---	High	High	Moderate
BgB:						
Bennington-------------	---	---	---	High	High	Moderate
BkA:						
Bixler-----------------	---	---	---	High	Moderate	Moderate
BkB:						
Bixler-----------------	---	---	---	High	Moderate	Moderate
BvG:						
Brecksville------------	Bedrock (paralithic)	20-40	---	Moderate	High	High
CaA:						
Cardington-------------	---	---	---	High	High	Moderate
CaB:						
Cardington-------------	---	---	---	High	High	Moderate
CbC2:						
Cardington-------------	---	---	---	High	High	Moderate
CcA:						
Castalia---------------	Bedrock (lithic)	20-40	---	Moderate	Low	Low
CcB:						
Castalia---------------	Bedrock (lithic)	20-40	---	Moderate	Low	Low
CcD:						
Castalia---------------	Bedrock (lithic)	20-40	---	Moderate	Low	Low

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Total subsidence	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In			
ChB:						
Chili	---	---	---	Moderate	Low	High
CmA:						
Colwood	---	---	---	High	High	Low
CnA:						
Colwood	Bedrock (paralithic)	40-60	---	High	High	Low
CoA:						
Condit	---	---	---	High	High	Moderate
CtB:						
Conotton	---	---	---	Moderate	Low	High
CuC:						
Conotton	---	---	---	Moderate	Low	High
DbB:						
Dekalb	Bedrock (lithic)	20-40	---	Low	Low	High
DbD:						
Dekalb	Bedrock (lithic)	20-40	---	Low	Low	High
DeA:						
Del Rey	---	---	---	High	High	Moderate
DuA:						
Dunbridge	Bedrock (lithic)	20-40	---	Moderate	Moderate	Low
DuB:						
Dunbridge	Bedrock (lithic)	20-40	---	Moderate	Moderate	Low
EcA:						
Elliott	Bedrock (lithic)	60-80	---	High	High	Moderate
EdB:						
Ellsworth	---	---	---	High	High	Moderate
EdC2:						
Ellsworth	---	---	---	High	High	Moderate
EnA:						
Elnora	---	---	---	Moderate	Low	Moderate
EoA:						
Elnora	Bedrock (paralithic)	40-60	---	Moderate	Low	Moderate
FoB:						
Fox	---	---	---	Moderate	Low	Moderate
FrA:						
Fries	Bedrock (paralithic)	20-40	---	Moderate	High	High
FuA:						
Fulton	---	---	---	Moderate	High	Moderate
GdA:						
Gilford	---	---	---	High	High	Moderate

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer		Total subsidence	Potential for frost action	Risk of corrosion	
	Kind	Depth to top			Uncoated steel	Concrete
		In	In			
HdA:						
Harrod	Bedrock (lithic)	20-40	---	High	High	Low
HkA:						
Haskins	---	---	---	High	High	Moderate
HoA:						
Holly	---	---	---	High	High	Moderate
HpB:						
Hornell	Bedrock (paralithic)	20-40	---	High	High	High
HrB:						
Hornell	Bedrock (paralithic)	20-40	---	High	High	High
HsA:						
Hornell	Bedrock (paralithic)	20-40	---	High	High	High
JtA:						
Jimtown	---	---	---	High	High	High
JuA:						
Joliet	Bedrock (lithic)	10-20	---	High	High	Low
KbA:						
Kibbie	---	---	---	High	High	Moderate
MaA:						
Mahoning	---	---	---	High	High	High
MaB:						
Mahoning	---	---	---	High	High	High
MbB:						
Marblehead	Bedrock (lithic)	4-10	---	Moderate	Low	Low
MeA:						
Mermill	---	---	---	High	Moderate	Moderate
MfA:						
Milford	---	---	---	High	High	Low
MgA:						
Millgrove	---	---	---	High	High	Low
MmA:						
Millsdale	Bedrock (lithic)	20-40	---	High	High	Low
MnA:						
Milton	Bedrock (lithic)	20-40	---	Moderate	High	Moderate
MnB:						
Milton	Bedrock (lithic)	20-40	---	Moderate	High	Moderate
MrA:						
Miner	---	---	---	High	High	Moderate
MsA:						
Miner	Bedrock (paralithic)	40-60	---	High	High	Moderate

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer		Total subsidence	Potential for frost action	Risk of corrosion	
	Kind	Depth to top			Uncoated steel	Concrete
		In	In			
MxA:						
Mitiwanga	Bedrock (lithic)	20-40	---	High	High	Moderate
MxB:						
Mitiwanga	Bedrock (lithic)	20-40	---	High	High	Moderate
NoA:						
Nolin	---	---	---	High	Low	Moderate
OaB:						
Oakville	---	---	---	Low	Low	Moderate
OgA:						
Ogontz	---	---	---	High	Moderate	Moderate
OhB:						
Ogontz	---	---	---	High	Moderate	Moderate
OmA:						
Olmstead	---	---	---	High	High	High
OpA:						
Orrville	Bedrock (lithic)	60-80	---	High	High	Moderate
OrA:						
Orrville	Bedrock (lithic)	60-80	---	High	High	Moderate
OsB:						
Oshtemo	---	---	---	Moderate	Low	High
PcA:						
Pewamo	---	---	---	High	High	Low
PmA:						
Plumbrook	---	---	---	High	Low	Moderate
RaA:						
Randolph	Bedrock (lithic)	20-40	---	High	High	Moderate
RcA:						
Rawson	---	---	---	Moderate	High	High
RcB:						
Rawson	---	---	---	Moderate	High	High
RgA:						
Rimer	---	---	---	High	High	Moderate
RhA:						
Ritchey	Bedrock (lithic)	10-20	---	Moderate	Moderate	Low
RhB:						
Ritchey	Bedrock (lithic)	10-20	---	Moderate	Moderate	Low
RhC:						
Ritchey	Bedrock (lithic)	10-20	---	Moderate	Moderate	Low
SaA:						
Sandusky	---	---	---	High	High	Low
SbF:						
Saylesville	---	---	---	Moderate	High	Moderate

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictive layer		Total subsidence	Potential for frost action	Risk of corrosion	
	Kind	Depth to top			Uncoated steel	Concrete
		In	In			
ShB:						
Shinrock	---	---	---	High	High	Moderate
SkC2:						
Shinrock	---	---	---	High	High	Moderate
SkD2:						
Shinrock	---	---	---	High	High	Moderate
SpB:						
Spinks	---	---	---	Low	Low	Low
SpD:						
Spinks	---	---	---	Low	Low	Low
TgA:						
Tioga	---	---	---	Moderate	Low	Moderate
TnA:						
Toledo	---	---	---	High	High	Low
ToA:						
Toledo	---	---	---	High	High	Low
TpA:						
Toledo	---	---	---	High	High	Low
TuA:						
Tuscola	---	---	---	High	Moderate	Low
TuB:						
Tuscola	---	---	---	High	Moderate	Low
UcB:						
Udipsamments.						
Spinks	---	---	---	Low	Low	Low
WaB:						
Wakeman	Bedrock (lithic)	20-40	---	Moderate	Low	High
WaC:						
Wakeman	Bedrock (lithic)	20-40	---	Moderate	Low	High
WeA:						
Weyers	---	---	---	High	High	Low
ZuC2:						
Zurich	---	---	---	High	Moderate	Moderate
ZuD2:						
Zurich	---	---	---	High	Moderate	Moderate
ZuE2:						
Zurich	---	---	---	High	Moderate	Moderate
ZuF:						
Zurich	---	---	---	High	Moderate	Moderate

Table 21.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Duration	Frequency
AaA:									
Adrian--------	D	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Very long	---	---
AeA:									
Algiers-------	C	January	1.0-2.0	>6.0	Apparent	---	---	---	---
		February	1.0-2.0	>6.0	Apparent	---	---	---	---
		March	1.0-2.0	>6.0	Apparent	---	---	---	---
		April	1.0-2.0	>6.0	Apparent	---	---	---	---
		May	1.0-2.0	>6.0	Apparent	---	---	---	---
		June	1.0-2.0	>6.0	Apparent	---	---	---	---
AkA:									
Allis---------	D	January	0.0-1.0	>6.0	Apparent	---	---	---	---
		February	0.0-1.0	>6.0	Apparent	---	---	---	---
		March	0.0-1.0	>6.0	Apparent	---	---	---	---
		April	0.0-1.0	>6.0	Apparent	---	---	---	---
		May	0.0-1.0	>6.0	Apparent	---	---	---	---
		June	0.0-1.0	>6.0	Apparent	---	---	---	---
		November	0.0-1.0	>6.0	Apparent	---	---	---	---
		December	0.0-1.0	>6.0	Apparent	---	---	---	---
AmD2:									
Amanda--------	C	January	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		February	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		March	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		April	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		May	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		December	4.0-6.0	4.5-6.0	Perched	---	---	---	---
AnG:									
Amanda--------	C	January	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		February	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		March	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		April	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		May	4.0-6.0	4.5-6.0	Perched	---	---	---	---
		December	4.0-6.0	4.5-6.0	Perched	---	---	---	---
Dekalb--------	C	All months	>6.0	>6.0	---	---	---	---	---
Rock outcrop.									
BdB:									
Belmore-------	B	All months	>6.0	>6.0	---	---	---	---	---
BeA:									
Bennington----	C	January	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		February	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		March	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		April	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		May	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		November	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		December	1.0-2.5	2.5-3.5	Perched	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Duration	Frequency
BgA:									
Bennington----	C	January	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		February	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		March	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		April	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		May	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		November	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		December	1.0-2.5	2.5-3.5	Perched	---	---	---	---
BgB:									
Bennington----	C	January	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		February	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		March	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		April	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		May	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		November	1.0-2.5	2.5-3.5	Perched	---	---	---	---
		December	1.0-2.5	2.5-3.5	Perched	---	---	---	---
BkA:									
Bixler--------	C	January	1.5-3.0	>6.0	Apparent	---	---	---	---
		February	1.5-3.0	>6.0	Apparent	---	---	---	---
		March	1.5-3.0	>6.0	Apparent	---	---	---	---
		April	1.5-3.0	>6.0	Apparent	---	---	---	---
		May	1.5-3.0	>6.0	Apparent	---	---	---	---
		November	1.5-3.0	>6.0	Apparent	---	---	---	---
		December	1.5-3.0	>6.0	Apparent	---	---	---	---
BkB:									
Bixler--------	C	January	1.5-3.0	>6.0	Apparent	---	---	---	---
		February	1.5-3.0	>6.0	Apparent	---	---	---	---
		March	1.5-3.0	>6.0	Apparent	---	---	---	---
		April	1.5-3.0	>6.0	Apparent	---	---	---	---
		May	1.5-3.0	>6.0	Apparent	---	---	---	---
		November	1.5-3.0	>6.0	Apparent	---	---	---	---
		December	1.5-3.0	>6.0	Apparent	---	---	---	---
BvG:									
Brecksville---	C	All months	>6.0	>6.0	---	---	---	---	---
CaA:									
Cardington----	C	January	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		November	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.5-4.0	Perched	---	---	---	---
CaB:									
Cardington----	C	January	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		November	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.5-4.0	Perched	---	---	---	---
CbC2:									
Cardington----	C	January	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		November	1.5-3.0	2.5-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.5-4.0	Perched	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
CcA:									
Castalia------	C	All months	>6.0	>6.0	---	---	---	---	---
CcB:									
Castalia------	C	All months	>6.0	>6.0	---	---	---	---	---
CcD:									
Castalia------	C	All months	>6.0	>6.0	---	---	---	---	---
ChB:									
Chili---------	B	All months	>6.0	>6.0	---	---	---	---	---
CmA:									
Colwood-------	B	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		October	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
CnA:									
Colwood-------	B	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		October	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
CoA:									
Condit--------	D	January	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		February	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		March	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		April	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		May	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		June	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		July	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		November	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
		December	0.0-1.0	3.0-5.0	Perched	0.0-1.0	Brief	---	---
CtB:									
Conotton------	B	All months	>6.0	>6.0	---	---	---	---	---
CuC:									
Conotton------	B	All months	>6.0	>6.0	---	---	---	---	---
DbB:									
Dekalb--------	C	All months	>6.0	>6.0	---	---	---	---	---
DbD:									
Dekalb--------	C	All months	>6.0	>6.0	---	---	---	---	---
DeA:									
Del Rey-------	C	January	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		February	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		March	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		April	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		May	1.0-2.0	2.0-4.0	Perched	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
DuA:									
Dunbridge-----	B	All months	>6.0	>6.0	---	---	---	---	---
DuB:									
Dunbridge-----	B	All months	>6.0	>6.0	---	---	---	---	---
EcA:									
Elliott-------	C	January	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		February	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		March	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		April	1.0-2.0	2.0-4.0	Perched	---	---	---	---
		May	1.0-2.0	2.0-4.0	Perched	---	---	---	---
EdB:									
Ellsworth-----	C	January	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		May	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		November	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.0-4.0	Perched	---	---	---	---
EdC2:									
Ellsworth-----	C	January	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		May	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		November	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.0-4.0	Perched	---	---	---	---
EnA:									
Elnora--------	B	January	1.5-2.0	>6.0	Apparent	---	---	---	---
		February	1.5-2.0	>6.0	Apparent	---	---	---	---
		March	1.5-2.0	>6.0	Apparent	---	---	---	---
		April	1.5-2.0	>6.0	Apparent	---	---	---	---
EoA:									
Elnora--------	B	January	1.5-2.0	>6.0	Apparent	---	---	---	---
		February	1.5-2.0	>6.0	Apparent	---	---	---	---
		March	1.5-2.0	>6.0	Apparent	---	---	---	---
		April	1.5-2.0	>6.0	Apparent	---	---	---	---
EsA:									
Endoaquents---	D	January	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		June	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
FnA:									
Fluvaquents---	D	January	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		February	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		March	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		April	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		May	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		June	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		October	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
		December	0.0-1.0	>6.0	Apparent	0.0-2.0	Very long	Very long	Frequent
FoB:									
Fox-----------	B	All months	>6.0	>6.0	---	---	---	---	---
FrA:									
Fries---------	D	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		June	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
FuA:									
Fulton--------	D	January	1.0-2.5	2.0-4.0	Perched	---	---	---	---
		February	1.0-2.5	2.0-4.0	Perched	---	---	---	---
		March	1.0-2.5	2.0-4.0	Perched	---	---	---	---
		April	1.0-2.5	2.0-4.0	Perched	---	---	---	---
		May	1.0-2.5	2.0-4.0	Perched	---	---	---	---
		December	1.0-2.5	2.0-4.0	Perched	---	---	---	---
GdA:									
Gilford-------	B	January	0.0-1.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
HdA:									
Harrod--------	B	January	1.0-2.0	>6.0	Apparent	---	---	Brief	Frequent
		February	1.0-2.0	>6.0	Apparent	---	---	Brief	Frequent
		March	1.0-2.0	>6.0	Apparent	---	---	Brief	Frequent
		April	1.0-2.0	>6.0	Apparent	---	---	Brief	Frequent
		May	---	---	---	---	---	Brief	Frequent
		June	---	---	---	---	---	Brief	Frequent
		November	---	---	---	---	---	Brief	Frequent
		December	1.0-2.0	>6.0	Apparent	---	---	Brief	Frequent
HkA:									
Haskins-------	C	January	1.0-2.5	2.5-5.0	Perched	---	---	---	---
		February	1.0-2.5	2.5-5.0	Perched	---	---	---	---
		March	1.0-2.5	2.5-5.0	Perched	---	---	---	---
		April	1.0-2.5	2.5-5.0	Perched	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
HoA:									
Holly---------	B	January	0.0-1.0	>6.0	Apparent	---	---	Long	Occasional
		February	0.0-1.0	>6.0	Apparent	---	---	Long	Occasional
		March	0.0-1.0	>6.0	Apparent	---	---	Long	Occasional
		April	0.0-1.0	>6.0	Apparent	---	---	Long	Occasional
		May	0.0-1.0	>6.0	Apparent	---	---	Long	Occasional
		November	---	---	---	---	---	Long	Occasional
		December	0.0-1.0	>6.0	Apparent	---	---	Long	Occasional
HpB:									
Hornell-------	D	January	0.5-1.5	>6.0	Apparent	---	---	---	---
		February	0.5-1.5	>6.0	Apparent	---	---	---	---
		March	0.5-1.5	>6.0	Apparent	---	---	---	---
		April	0.5-1.5	>6.0	Apparent	---	---	---	---
		November	0.5-1.5	>6.0	Apparent	---	---	---	---
		December	0.5-1.5	>6.0	Apparent	---	---	---	---
HrB:									
Hornell-------	D	January	0.5-1.5	>6.0	Apparent	---	---	---	---
		February	0.5-1.5	>6.0	Apparent	---	---	---	---
		March	0.5-1.5	>6.0	Apparent	---	---	---	---
		April	0.5-1.5	>6.0	Apparent	---	---	---	---
		November	0.5-1.5	>6.0	Apparent	---	---	---	---
		December	0.5-1.5	>6.0	Apparent	---	---	---	---
HsA:									
Hornell-------	D	January	0.5-1.5	>6.0	Apparent	---	---	---	---
		February	0.5-1.5	>6.0	Apparent	---	---	---	---
		March	0.5-1.5	>6.0	Apparent	---	---	---	---
		April	0.5-1.5	>6.0	Apparent	---	---	---	---
		November	0.5-1.5	>6.0	Apparent	---	---	---	---
		December	0.5-1.5	>6.0	Apparent	---	---	---	---
JtA:									
Jimtown-------	C	January	1.0-2.5	>6.0	Apparent	---	---	---	---
		February	1.0-2.5	>6.0	Apparent	---	---	---	---
		March	1.0-2.5	>6.0	Apparent	---	---	---	---
		April	1.0-2.5	>6.0	Apparent	---	---	---	---
		May	1.0-2.5	>6.0	Apparent	---	---	---	---
		December	1.0-2.5	>6.0	Apparent	---	---	---	---
JuA:									
Joliet--------	D	March	0.0-1.0	>6.0	Apparent	---	---	---	---
		April	0.0-1.0	>6.0	Apparent	---	---	---	---
		May	0.0-1.0	>6.0	Apparent	---	---	---	---
		June	0.0-1.0	>6.0	Apparent	---	---	---	---
KbA:									
Kibbie--------	B	January	1.0-2.0	>6.0	Apparent	---	---	---	---
		February	1.0-2.0	>6.0	Apparent	---	---	---	---
		March	1.0-2.0	>6.0	Apparent	---	---	---	---
		April	1.0-2.0	>6.0	Apparent	---	---	---	---
		May	1.0-2.0	>6.0	Apparent	---	---	---	---
		November	1.0-2.0	>6.0	Apparent	---	---	---	---
		December	1.0-2.0	>6.0	Apparent	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
MaA:									
Mahoning------	D	January	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		February	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		March	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		April	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		May	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		June	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		November	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		December	0.5-1.5	1.5-3.0	Perched	---	---	---	---
MaB:									
Mahoning------	D	January	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		February	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		March	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		April	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		May	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		June	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		November	0.5-1.5	1.5-3.0	Perched	---	---	---	---
		December	0.5-1.5	1.5-3.0	Perched	---	---	---	---
MbB:									
Marblehead----	C	All months	>6.0	>6.0	---	---	---	---	---
MeA:									
Mermill-------	B	January	0.0-1.0	2.0-4.0	Perched	0.0-1.0	Brief	---	---
		February	0.0-1.0	2.0-4.0	Perched	0.0-1.0	Brief	---	---
		March	0.0-1.0	2.0-4.0	Perched	0.0-1.0	Brief	---	---
		April	0.0-1.0	2.0-4.0	Perched	0.0-1.0	Brief	---	---
		May	0.0-1.0	2.0-4.0	Perched	0.0-1.0	Brief	---	---
		December	0.0-1.0	2.0-4.0	Perched	0.0-1.0	Brief	---	---
MfA:									
Milford-------	B	March	0.0-2.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		April	0.0-2.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		May	0.0-2.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
		June	0.0-2.0	>6.0	Apparent	0.0-0.5	Very brief	---	---
MgA:									
Millgrove-----	B	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
MmA:									
Millsdale-----	C	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
MnA:									
Milton--------	C	All months	>6.0	>6.0	---	---	---	---	---
MnB:									
Milton--------	C	All months	>6.0	>6.0	---	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Duration	Frequency
MrA:									
Miner---------	D	January	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		February	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		March	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		April	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		May	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		June	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		November	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		December	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
MsA:									
Miner---------	D	January	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		February	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		March	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		April	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		May	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		June	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		November	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
		December	0.0-1.0	2.5-5.0	Perched	0.0-1.0	Brief	---	---
MxA:									
Mitiwanga-----	C	January	1.0-2.5	>6.0	Apparent	---	---	---	---
		February	1.0-2.5	>6.0	Apparent	---	---	---	---
		March	1.0-2.5	>6.0	Apparent	---	---	---	---
		April	1.0-2.5	>6.0	Apparent	---	---	---	---
		May	1.0-2.5	>6.0	Apparent	---	---	---	---
		June	1.0-2.5	>6.0	Apparent	---	---	---	---
		November	1.0-2.5	>6.0	Apparent	---	---	---	---
		December	1.0-2.5	>6.0	Apparent	---	---	---	---
MxB:									
Mitiwanga-----	C	January	1.0-2.5	>6.0	Apparent	---	---	---	---
		February	1.0-2.5	>6.0	Apparent	---	---	---	---
		March	1.0-2.5	>6.0	Apparent	---	---	---	---
		April	1.0-2.5	>6.0	Apparent	---	---	---	---
		May	1.0-2.5	>6.0	Apparent	---	---	---	---
		June	1.0-2.5	>6.0	Apparent	---	---	---	---
		November	1.0-2.5	>6.0	Apparent	---	---	---	---
		December	1.0-2.5	>6.0	Apparent	---	---	---	---
NoA:									
Nolin---------	B	February	3.0-6.0	>6.0	Apparent	---	---	Brief	Occasional
		March	3.0-6.0	>6.0	Apparent	---	---	Brief	Occasional
		April	---	---	---	---	---	Brief	Occasional
		May	---	---	---	---	---	Brief	Occasional
OaB:									
Oakville------	A	All months	>6.0	>6.0	---	---	---	---	---
OgA:									
Ogontz--------	C	January	1.5-3.0	>6.0	Apparent	---	---	---	---
		February	1.5-3.0	>6.0	Apparent	---	---	---	---
		March	1.5-3.0	>6.0	Apparent	---	---	---	---
		April	1.5-3.0	>6.0	Apparent	---	---	---	---
		May	1.5-3.0	>6.0	Apparent	---	---	---	---
		November	1.5-3.0	>6.0	Apparent	---	---	---	---
		December	1.5-3.0	>6.0	Apparent	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Duration	Frequency
OhB:									
Ogontz--------	C	January	1.5-3.0	>6.0	Apparent	---	---	---	---
		February	1.5-3.0	>6.0	Apparent	---	---	---	---
		March	1.5-3.0	>6.0	Apparent	---	---	---	---
		April	1.5-3.0	>6.0	Apparent	---	---	---	---
		May	1.5-3.0	>6.0	Apparent	---	---	---	---
		November	1.5-3.0	>6.0	Apparent	---	---	---	---
		December	1.5-3.0	>6.0	Apparent	---	---	---	---
OmA:									
Olmstead------	B	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Very brief	---	---
OpA:									
Orrville------	C	January	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
		February	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
		March	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
		April	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
		May	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
		June	1.0-2.5	>6.0	Apparent	---	---	---	---
		November	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
		December	1.0-2.5	>6.0	Apparent	---	---	Brief	Occasional
OrA:									
Orrville------	C	January	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
		February	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
		March	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
		April	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
		May	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
		June	1.0-2.5	>6.0	Apparent	---	---	---	---
		November	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
		December	1.0-2.5	>6.0	Apparent	---	---	Brief	Frequent
OsB:									
Oshtemo-------	B	All months	>6.0	>6.0	---	---	---	---	---
PcA:									
Pewamo--------	C	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
PmA:									
Plumbrook-----	B	January	1.0-2.5	5.0-6.0	Perched	---	---	---	---
		February	1.0-2.5	5.0-6.0	Perched	---	---	---	---
		March	1.0-2.5	5.0-6.0	Perched	---	---	---	---
		April	1.0-2.5	5.0-6.0	Perched	---	---	---	---
		May	1.0-2.5	5.0-6.0	Perched	---	---	---	---
		December	1.0-2.5	5.0-6.0	Perched	---	---	---	---
RaA:									
Randolph------	C	January	1.0-2.5	>6.0	Apparent	---	---	---	---
		February	1.0-2.5	>6.0	Apparent	---	---	---	---
		March	1.0-2.5	>6.0	Apparent	---	---	---	---
		April	1.0-2.5	>6.0	Apparent	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
RcA:									
Rawson--------	B	January	2.0-3.5	2.5-4.0	Perched	---	---	---	---
		February	2.0-3.5	2.5-4.0	Perched	---	---	---	---
		March	2.0-3.5	2.5-4.0	Perched	---	---	---	---
		April	2.0-3.5	2.5-4.0	Perched	---	---	---	---
RcB:									
Rawson--------	B	January	2.0-3.5	2.5-4.0	Perched	---	---	---	---
		February	2.0-3.5	2.5-4.0	Perched	---	---	---	---
		March	2.0-3.5	2.5-4.0	Perched	---	---	---	---
		April	2.0-3.5	2.5-4.0	Perched	---	---	---	---
RgA:									
Rimer---------	C	January	1.0-2.5	2.0-5.0	Perched	---	---	---	---
		February	1.0-2.5	2.0-5.0	Perched	---	---	---	---
		March	1.0-2.5	2.0-5.0	Perched	---	---	---	---
		April	1.0-2.5	2.0-5.0	Perched	---	---	---	---
RhA:									
Ritchey-------	D	All months	>6.0	>6.0	---	---	---	---	---
RhB:									
Ritchey-------	D	All months	>6.0	>6.0	---	---	---	---	---
RhC:									
Ritchey-------	D								
		All months	>6.0	>6.0	---	---	---	---	---
SaA:									
Sandusky------	D	January	0.0-0.5	>6.0	Apparent	---	---	---	---
		February	0.0-0.5	>6.0	Apparent	---	---	---	---
		March	0.0-0.5	>6.0	Apparent	---	---	---	---
		April	0.0-0.5	>6.0	Apparent	---	---	---	---
		May	0.0-0.5	>6.0	Apparent	---	---	---	---
		June	0.0-0.5	>6.0	Apparent	---	---	---	---
		November	0.0-0.5	>6.0	Apparent	---	---	---	---
		December	0.0-0.5	>6.0	Apparent	---	---	---	---
SbF:									
Saylesville---	C	January	3.0-6.0	>6.0	Apparent	---	---	---	---
		February	3.0-6.0	>6.0	Apparent	---	---	---	---
		March	3.0-6.0	>6.0	Apparent	---	---	---	---
		April	3.0-6.0	>6.0	Apparent	---	---	---	---
		May	3.0-6.0	>6.0	Apparent	---	---	---	---
		November	3.0-6.0	>6.0	Apparent	---	---	---	---
		December	3.0-6.0	>6.0	Apparent	---	---	---	---
ShB:									
Shinrock------	C	January	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		May	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.0-4.0	Perched	---	---	---	---
SkC2:									
Shinrock------	C	January	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		May	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.0-4.0	Perched	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding		Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Duration	Frequency
SkD2:									
Shinrock------	C	January	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		February	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		March	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		April	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		May	1.5-3.0	2.0-4.0	Perched	---	---	---	---
		December	1.5-3.0	2.0-4.0	Perched	---	---	---	---
SpB:									
Spinks--------	A	All months	>6.0	>6.0	---	---	---	---	---
SpD:									
Spinks--------	A	All months	>6.0	>6.0	---	---	---	---	---
TgA:									
Tioga---------	B	January	---	---	---	---	---	Brief	Occasional
		February	3.0-6.0	>6.0	Apparent	---	---	Brief	Occasional
		March	3.0-6.0	>6.0	Apparent	---	---	Brief	Occasional
		April	3.0-6.0	>6.0	Apparent	---	---	Brief	Occasional
		May	---	---	---	---	---	Brief	Occasional
		November	---	---	---	---	---	Brief	Occasional
		December	---	---	---	---	---	Brief	Occasional
TnA:									
Toledo--------	D	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
ToA:									
Toledo--------	D	January	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-1.0	Brief	---	---
TpA:									
Toledo--------	D	January	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		February	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		March	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		April	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		May	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		September	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		October	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		November	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
		December	0.0-1.0	>6.0	Apparent	0.0-3.0	Very long	---	---
TuA:									
Tuscola-------	B	January	1.5-3.0	>6.0	Apparent	---	---	---	---
		February	1.5-3.0	>6.0	Apparent	---	---	---	---
		March	1.5-3.0	>6.0	Apparent	---	---	---	---
		April	1.5-3.0	>6.0	Apparent	---	---	---	---
		November	1.5-3.0	>6.0	Apparent	---	---	---	---
		December	1.5-3.0	>6.0	Apparent	---	---	---	---
TuB:									
Tuscola-------	B	January	1.5-3.0	>6.0	Apparent	---	---	---	---
		February	1.5-3.0	>6.0	Apparent	---	---	---	---
		March	1.5-3.0	>6.0	Apparent	---	---	---	---
		April	1.5-3.0	>6.0	Apparent	---	---	---	---
		November	1.5-3.0	>6.0	Apparent	---	---	---	---
		December	1.5-3.0	>6.0	Apparent	---	---	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Flooding: Duration	Flooding: Frequency
UcB:									
Udipsamments--	---	All months	>6.0	>6.0	---	---	---	---	---
Spinks--------	A	All months	>6.0	>6.0	---	---	---	---	---
WaB:									
Wakeman-------	C	All months	>6.0	>6.0	---	---	---	---	---
WaC:									
Wakeman-------	C	All months	>6.0	>6.0	---	---	---	---	---
WeA:									
Weyers--------	C	January	0.0-0.5	>6.0	Apparent	---	---	---	---
		February	0.0-0.5	>6.0	Apparent	---	---	---	---
		March	0.0-0.5	>6.0	Apparent	---	---	---	---
		April	0.0-0.5	>6.0	Apparent	---	---	---	---
		May	0.0-0.5	>6.0	Apparent	---	---	---	---
		June	0.0-0.5	>6.0	Apparent	---	---	---	---
		November	0.0-0.5	>6.0	Apparent	---	---	---	---
		December	0.0-0.5	>6.0	Apparent	---	---	---	---
ZuC2:									
Zurich--------	B	January	2.0-3.5	>6.0	Apparent	---	---	---	---
		February	2.0-3.5	>6.0	Apparent	---	---	---	---
		March	2.0-3.5	>6.0	Apparent	---	---	---	---
		April	2.0-3.5	>6.0	Apparent	---	---	---	---
		May	2.0-3.5	>6.0	Apparent	---	---	---	---
		December	2.0-3.5	>6.0	Apparent	---	---	---	---
ZuD2:									
Zurich--------	B	January	2.0-3.5	>6.0	Apparent	---	---	---	---
		February	2.0-3.5	>6.0	Apparent	---	---	---	---
		March	2.0-3.5	>6.0	Apparent	---	---	---	---
		April	2.0-3.5	>6.0	Apparent	---	---	---	---
		May	2.0-3.5	>6.0	Apparent	---	---	---	---
		December	2.0-3.5	>6.0	Apparent	---	---	---	---
ZuE2:									
Zurich--------	B	January	2.0-3.5	>6.0	Apparent	---	---	---	---
		February	2.0-3.5	>6.0	Apparent	---	---	---	---
		March	2.0-3.5	>6.0	Apparent	---	---	---	---
		April	2.0-3.5	>6.0	Apparent	---	---	---	---
		May	2.0-3.5	>6.0	Apparent	---	---	---	---
		December	2.0-3.5	>6.0	Apparent	---	---	---	---
ZuF:									
Zurich--------	B	January	2.0-3.5	>6.0	Apparent	---	---	---	---
		February	2.0-3.5	>6.0	Apparent	---	---	---	---
		March	2.0-3.5	>6.0	Apparent	---	---	---	---
		April	2.0-3.5	>6.0	Apparent	---	---	---	---
		May	2.0-3.5	>6.0	Apparent	---	---	---	---
		December	2.0-3.5	>6.0	Apparent	---	---	---	---

Table 22.--Engineering Index Test Data

(Dashes indicate that the test was not performed. MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; and PI, plasticity index. Tests were performed by the Ohio Department of Transportation, Division of Highways, Columbus, Ohio.)

Soil name and location	Sample number	Horizon	Depth	Moisture density		Percentage passing sieve--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200			AASHTO	Unified
			In										
Mitiwanga silt loam,	ER-46-												
0 to 2 percent slopes:	68919	Ap	0-9	---	---	100	100	95	77	29	24	A-4	ML
3,560 feet south of the													
intersection of Township	68920	Bt	11-25	---	---	82	65	59	42	37	27	A-4	SM
Road 145 and Township													
Road 144, along Township													
Road 145, then 750 feet													
west; T. 5 N., R. 20 W.													
Ogontz fine sandy loam	ER-43-												
0 to 2 percent slopes:	60652	Ap	0-10	114.2	12.5	100	100	97	60	NP	NP	A-4	SM
1,050 feet northwest of the													
intersection of County	60653	Bt	12-30	112.3	15.7	100	100	99	88	32	13	A-6	ML
Road 132 and State Route 2,													
along County Road 132, then													
1,125 feet west; T. 6 N.,													
R. 22 W.													
Plumbrook fine sandy loam,	ER-45-												
0 to 2 percent slopes:	68313	Ap	0-11	---	---	100	100	100	35	NP	NP	A-3	SM
1,200 feet north of the													
intersection of U.S.	68314	Bg & Bw	11-29	---	---	100	100	99	33	NP	NP	A-3	SM
Route 250 and Township													
Road 12, along U.S.	68315	Cg	29-65	---	---	100	100	100	21	NP	NP	A-3	SM
Route 250, then 485 feet													
west; T. 6. N., R. 22 W.	68316	2Cg	65-80	---	---	100	100	99	95	NP	NP	A-6	CL
Wakeman sandy loam,	ER-44-												
2 to 6 percent slopes:	68311	Ap	0-10	---	---	100	100	78	37	NP	NP	A-4	SM
2,100 feet south of the													
intersection of Township		Bw	10-27	---	---	100	100	82	40	NP	NP	A-4	SM
Road 134 and County													
Road 13, along Township													
Road 134, then 100 feet													
west; T. 5 N., R. 21 W.													

Table 23.--Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisaprists
Algiers	Fine-loamy, mixed, superactive, nonacid, mesic Aquic Udifluents
Allis	Fine, illitic, acid, mesic Typic Endoaquepts
Amanda	Fine-loamy, mixed, active, mesic Typic Hapludalfs
*Belmore	Fine-loamy, mixed, active, mesic Typic Hapludalfs
Bennington	Fine, illitic, mesic Aeric Epiaqualfs
Bixler	Loamy, mixed, active, mesic Aquic Arenic Hapludalfs
Brecksville	Fine-loamy, mixed, active, mesic Typic Dystrochepts
Cardington	Fine, illitic, mesic Aquic Hapludalfs
Castalia	Loamy-skeletal, carbonatic, mesic Eutrochreptic Rendolls
Chili	Fine-loamy, mixed, active, mesic Typic Hapludalfs
Colwood	Fine-loamy, mixed, active, mesic Typic Endoaquolls
Condit	Fine, illitic, mesic Typic Epiaqualfs
Conotton	Loamy-skeletal, mixed, active, mesic Typic Hapludalfs
Dekalb	Loamy-skeletal, siliceous, subactive, mesic Typic Dystrochepts
Del Rey	Fine, illitic, mesic Aeric Epiaqualfs
Dunbridge	Fine-loamy, mixed, active, mesic Mollic Hapludalfs
Elliott	Fine, illitic, mesic Aquic Argiudolls
Ellsworth	Fine, illitic, mesic Aquic Hapludalfs
Elnora	Mixed, mesic Aquic Udipsamments
Endoaquents	Fine-loamy, mixed, mesic Typic Endoaquents
Fluvaquents	Fine-silty, mixed, mesic Typic Fluvaquents
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Typic Hapludalfs
Fries	Fine, illitic, mesic Typic Endoaquolls
Fulton	Fine, illitic, mesic Aeric Epiaqualfs
Gilford	Coarse-loamy, mixed, superactive, mesic Typic Endoaquolls
Harrod	Fine-loamy, mixed, superactive, mesic Fluvaquentic Hapludolls
Haskins	Fine-loamy, mixed, active, mesic Aeric Epiaqualfs
Holly	Fine-loamy, mixed, active, nonacid, mesic Typic Fluvaquents
Hornell	Fine, illitic, acid, mesic Aeric Endoaquepts
Jimtown	Fine-loamy, mixed, active, mesic Aeric Endoaqualfs
Joliet	Loamy, mixed, superactive, mesic Lithic Endoaquolls
*Kibbie	Fine-loamy, mixed, active, mesic Aquollic Hapludalfs
Mahoning	Fine, illitic, mesic Aeric Epiaqualfs
Marblehead	Loamy, mixed, superactive, mesic Lithic Hapludolls
*Mermill	Fine-loamy, mixed, active, mesic Mollic Epiaqualfs
Milford	Fine, mixed, superactive, mesic Typic Endoaquolls
Millgrove	Fine-loamy, mixed, superactive, mesic Typic Argiaquolls
Millsdale	Fine, mixed, active, mesic Typic Argiaquolls
Milton	Fine, mixed, active, mesic Typic Hapludalfs
Miner	Fine, illitic, mesic Mollic Epiaqualfs
Mitiwanga	Fine-loamy, mixed, active, mesic Aeric Endoaqualfs
Nolin	Fine-silty, mixed, active, mesic Dystric Fluventic Eutrochrepts
Oakville	Mixed, mesic Typic Udipsamments
Ogontz	Fine-silty, mixed, active, mesic Aquic Hapludalfs
Olmsted	Fine-loamy, mixed, active, mesic Mollic Endoaqualfs
Orrville	Fine-loamy, mixed, active, nonacid, mesic Aeric Fluvaquents
Oshtemo	Coarse-loamy, mixed, active, mesic Typic Hapludalfs
*Pewamo	Fine, mixed, active, mesic Typic Argiaquolls
Plumbrook	Coarse-loamy, mixed, superactive, mesic Aquic Hapludolls
Randolph	Fine, mixed, active, mesic Aeric Endoaqualfs
Rawson	Fine-loamy, mixed, active, mesic Oxyaquic Hapludalfs
Rimer	Loamy, mixed, active, mesic Aquic Arenic Hapludalfs
Ritchey	Loamy, mixed, superactive, mesic Lithic Hapludalfs
Sandusky	Fine-loamy, carbonatic, mesic Fluvaquentic Endoaquolls
Saylesville	Fine, illitic, mesic Typic Hapludalfs
Shinrock	Fine, illitic, mesic Aquic Hapludalfs
Spinks	Sandy, mixed, mesic Lamellic Hapludalfs
Tioga	Coarse-loamy, mixed, semiactive, mesic Dystric Fluventic Eutrochrepts
Toledo	Fine, illitic, nonacid, mesic Mollic Endoaquepts

Table 23.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Tuscola	Fine-loamy, mixed, active, mesic Aquic Hapludalfs
Udipsamments	Mixed, mesic Typic Udipsamments
Udorthents	Fine-loamy, mixed, mesic Typic Udorthents
Wakeman	Coarse-loamy, mixed, active, mesic Dystric Eutrochrepts
Weyers	Coarse-loamy, carbonatic, mesic Fluvaquentic Endoaquolls
Zurich	Fine-silty, mixed, superactive, mesic Oxyaquic Hapludalfs

Interpretive Groups

Interpretive Groups

(Dashes indicate that the soil is not assigned to an interpretive group.)

Map symbol and soil name	Land capability	Prime farmland	Woodland ordination symbol	Pasture and hayland suitability group
AaA--------------- Adrian	5W	No	2W	D-1
AeA--------------- Algiers	2W	Yes*	4A	C-1
AkA--------------- Allis	4W	No	2W	C-2
AmD2-------------- Amanda	4E	No	5R	A-1
AnG---------------	7E	No		
Amanda-----------			5R	H-1
Dekalb-----------			2R	H-1
Rock outcrop-----			---	---
BdB--------------- Belmore	2E	Yes	4A	A-1
BeA--------------- Bennington	2W	Yes*	4A	C-1
BgA--------------- Bennington	2W	Yes*	4A	C-1
BgB--------------- Bennington	2E	Yes*	4A	C-1
BkA--------------- Bixler	2W	Yes*	4S	C-1
BkB--------------- Bixler	2E	Yes*	4S	C-1
BvG--------------- Brecksville	7E	No	4R	H-1
CaA--------------- Cardington	1	Yes	4A	A-6
CaB--------------- Cardington	2E	Yes	4A	A-6
CbC2-------------- Cardington	3E	No	4A	A-6
CcA--------------- Castalia	3S	No	2D	F-1
CcB--------------- Castalia	3S	No	2D	F-1
CcD--------------- Castalia	6S	No	2R	F-1
ChB--------------- Chili	2E	Yes	4A	A-1

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Prime farmland	Woodland ordination symbol	Pasture and hayland suitability group
CmA--------------- Colwood	2W	Yes*	5W	C-1
CnA--------------- Colwood	2W	Yes*	5W	C-1
CoA--------------- Condit	3W	Yes*	5W	C-2
CtB--------------- Conotton	3S	Yes	4F	B-1
CuC--------------- Conotton	4E	No	4F	B-1
DbB--------------- Dekalb	2E	No	3F	F-1
DbD--------------- Dekalb	4E	No	2R	F-1
DeA--------------- Del Rey	2W	Yes*	4C	C-1
DuA--------------- Dunbridge	3S	Yes	4D	F-1
DuB--------------- Dunbridge	3E	Yes	4D	F-1
EcA--------------- Elliott	2W	Yes*	---	C-1
EdB--------------- Ellsworth	3E	Yes	4A	A-6
EdC2-------------- Ellsworth	4E	No	4A	A-6
EnA--------------- Elnora	2W	No	3S	B-1
EoA--------------- Elnora	2W	No	3S	B-1
FoB--------------- Fox	2E	Yes	4A	A-1
FrA--------------- Fries	3W	Yes*	5W	C-2
FuA--------------- Fulton	3W	Yes*	4C	C-2
GdA--------------- Gilford	2W	Yes*	4W	C-1
HdA--------------- Harrod	3W	Yes**	5D	F-1
HkA--------------- Haskins	2W	Yes*	4A	C-1

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Prime farmland	Woodland ordination symbol	Pasture and hayland suitability group
HoA---------------Holly	3W	Yes*	5W	C-3
HpB---------------Hornell	3E	Yes*	3W	C-2
HrB---------------Hornell	3E	Yes*	3W	C-2
HsA---------------Hornell	3W	Yes*	3W	C-2
JtA---------------Jimtown	2W	Yes*	5A	C-1
JuA---------------Joliet	4W	Yes*	---	E-1
KbA---------------Kibbie	2W	Yes*	5A	C-1
MaA---------------Mahoning	3W	Yes*	5C	C-2
MaB---------------Mahoning	3E	Yes*	5C	C-2
MbB---------------Marblehead	6S	No	2D	E-1
MeA---------------Mermill	2W	Yes*	5W	C-1
MfA---------------Milford	2W	Yes*	---	C-1
MgA---------------Millgrove	2W	Yes*	5W	C-1
MmA---------------Millsdale	3W	Yes*	5W	C-2
MnA---------------Milton	2S	Yes	4D	F-1
MnB---------------Milton	2E	Yes	4D	F-1
MrA---------------Miner	3W	Yes*	5W	C-2
MsA---------------Miner	3W	Yes*	5W	C-2
MxA---------------Mitiwanga	2W	Yes*	4D	C-2
MxB---------------Mitiwanga	2E	Yes*	4D	C-2
NoA---------------Nolin	2W	Yes	8A	A-5

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Prime farmland	Woodland ordination symbol	Pasture and hayland suitability group
OaB--------------- Oakville	4S	No	4S	B-1
OgA--------------- Ogontz	1	Yes	5A	A-6
OhB--------------- Ogontz	2E	Yes	5A	A-6
OmA--------------- Olmsted	2W	Yes*	5W	C-1
OpA--------------- Orrville	2W	Yes*	5A	C-3
OrA--------------- Orrville	2W	Yes***	5A	C-3
OsB--------------- Oshtemo	3S	Yes	4A	A-1
PcA--------------- Pewamo	2W	Yes*	5W	C-1
PmA--------------- Plumbrook	2W	Yes*	---	C-1
RaA--------------- Randolph	3W	Yes*	4D	C-2
RcA--------------- Rawson	1	Yes	4A	A-1
RcB--------------- Rawson	2E	Yes	4A	A-1
RgA--------------- Rimer	2W	Yes*	4A	C-1
RhA--------------- Ritchey	3S	No	2D	E-1
RhB--------------- Ritchey	3E	No	2D	E-1
RhC--------------- Ritchey	4E	No	2D	E-1
SaA--------------- Sandusky	3W	Yes*	3W	C-1
SbF--------------- Saylesville	7E	No	4R	A-3
ShB--------------- Shinrock	2E	Yes	4C	A-6
SkC2-------------- Shinrock	3E	No	4C	A-6
SkD2-------------- Shinrock	4E	No	4R	A-6

See footnotes at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability	Prime farmland	Woodland ordination symbol	Pasture and hayland suitability group
SpB--------------- Spinks	3S	No	4A	B-1
SpD--------------- Spinks	4E	No	4R	B-1
TgA--------------- Tioga	2W	Yes	4A	A-5
TnA--------------- Toledo	3W	Yes*	4W	C-2
ToA--------------- Toledo	3W	Yes*	4W	C-2
TpA--------------- Toledo	4W	No	---	---
TuA--------------- Tuscola	1	Yes	5A	A-6
TuB--------------- Tuscola	2E	Yes	5A	A-6
UcB--------------- Udipsamments-----	4S	No	---	---
Spinks-----------			4A	B-1
WaB--------------- Wakeman	2E	Yes	4A	F-1
WaC--------------- Wakeman	3E	No	4A	F-1
WeA--------------- Weyers	3W	Yes*	3W	C-1
ZuC2-------------- Zurich	3E	No	4A	A-6
ZuD2-------------- Zurich	4E	No	4R	A-6
ZuE2-------------- Zurich	6E	No	4R	A-6
ZuF--------------- Zurich	7E	No	4R	A-6

* Where drained.

** Where protected from flooding or not frequently flooded during the growing season.

*** Where drained and protected from flooding or not frequently flooded during the growing season.

NRCS Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.