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; The Ohio State University Extension; Paulding Soil and Water Conservation District; and the Paulding County Commissioners

Soil Survey of Paulding 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.

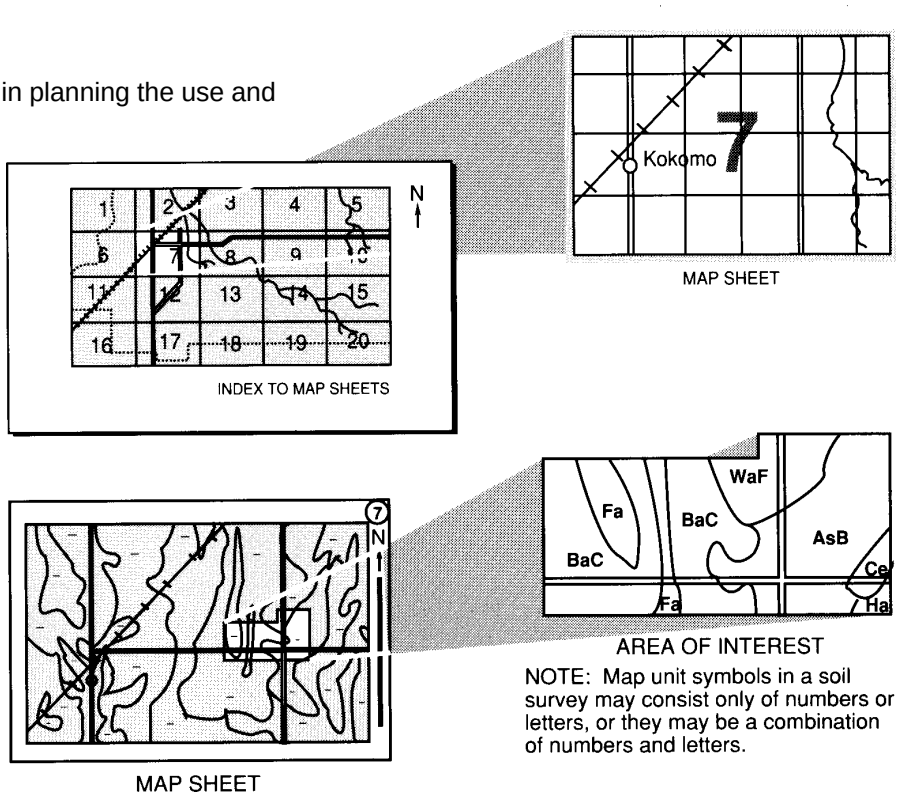
Detailed Soil Maps

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.



A portion of the **State Soil Geographic Database (STATSGO)** is available for this county. This database consists of a soil map at a scale of 1:250,000 and descriptions of groups of associated soils. It replaces the general soil map published in earlier soil surveys. The map and the database can be used for multicounty planning, and map output can be tailored for a specific use. More information about the State Soil Geographic database for this county or for any other part of Ohio is available at the local office of the Natural Resources Conservation Service.

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 1991. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1993. 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; and The Ohio State University Extension. The survey is part of the technical assistance furnished to the Paulding Soil and Water Conservation District. Additional funds were provided by the Paulding County Commissioners.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: A pond in an area of Latty silty clay on a typical farmstead in Blue Creek Township, Paulding County, Ohio.

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

Contents

Issued 2002

Foreword

This soil survey contains information that affects land use planning in this survey area. 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, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Kevin Brown
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Soil Survey of
Paulding County, Ohio

By Mark M. Feusner and Rick A. Robbins, Ohio Department of Natural Resources, Division of Soil and Water Conservation, and Jeffrey A. Glanville, Natural Resources Conservation Service

Fieldwork by Rick A. Robbins, Mark M. Feusner, and K. Ed Miller, 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 Paulding Soil and Water Conservation District; and the Paulding County Commissioners

Paulding County is in northwestern Ohio (fig. 1). It borders the State of Indiana. The county has an area of about 268,100 acres, or 419 square miles. Paulding, the county seat, is near the center of the county. In 1990, the population of the county was 20,488 and the population of the village of Paulding was 2,605 (Rand McNally, 1992).

Most of the county is used for farming. The main enterprises are cash-grain farming and some livestock production and dairying. Urban or built-up land makes up about 1.4 percent of the county and is expanding at a very slow pace (Paulding Soil and Water Conservation District, 1986). Most areas that are used as farmland have been drained for improved crop production.

Most of Paulding County is level to gently sloping. The land is dissected in some areas by small rivers and streams. Wetness is a major limitation affecting the use of most of the soils in the county. The hazard of erosion is generally severe in sloping to steep areas along stream valleys. The low, loamy beach ridges in the county are locally unique physiographic features. These ridges are in the southwestern and northeastern parts of the county and make up approximately 3,750 acres.

This soil survey updates the survey of Paulding County published in 1960 (Baker and others, 1960). The current survey provides more detailed information on recent aerial photography. An earlier survey was published in 1915 (Lewis and Shiffler, 1915).

General Nature of the County

This section provides some general information about the survey area. It describes climate; physiography, relief, and drainage; farming; natural resources; history; and recreation.

Climate

Paulding County is cold in winter and quite warm in summer. Winter precipitation, which frequently occurs as snow, results in a good accumulation of soil moisture by spring and thus minimizes drought in most areas. The normal annual precipitation is adequate for all of the crops that are suited to the temperature and growing season in the county.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Paulding in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 25 degrees F and the average daily minimum temperature is 16 degrees. The lowest temperature on record, which occurred at Paulding on January 21, 1984, is -25

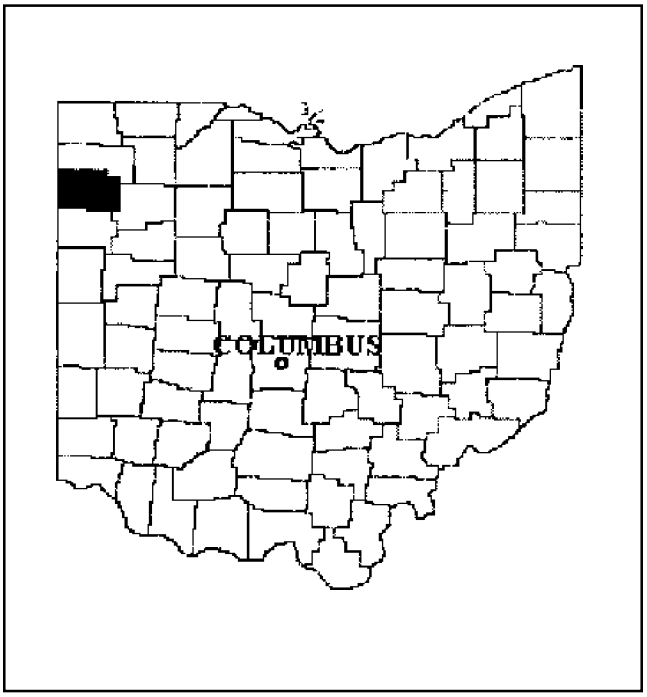

Figure 1.—Location of Paulding County in Ohio.

degrees. In summer, the average temperature is 70 degrees and the average daily maximum temperature is 83 degrees. The highest temperature, which occurred at Paulding on July 14, 1936, is 111 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 33.43 inches. Of this total, 19.45 inches, or 58 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 6.39 inches at Paulding on September 14, 1972. Thunderstorms occur on about 39 days each year, and most occur in June.

The average seasonal snowfall is 21 inches. The greatest snow depth at any one time during the period of record was 20 inches. On an average, 19 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 11 inches.

The average relative humidity in midafternoon is about 62 percent. Humidity is higher at night, and the average at dawn is about 82 percent. The sun shines 74 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in March.

Physiography, Relief, and Drainage

Paulding County is entirely within the Lake Plain Section of the Central Lowlands Physiographic Province. The highest elevation in the county, about 775 feet above sea level, is along U.S. Highway 30 in the extreme southwestern part of the county. The lowest elevation, about 685 feet above sea level, is at the point where the Maumee River flows into Defiance County. Total relief is about 90 feet.

Paulding County is characterized by extensive areas of broad flats, which were formed during various stages of glacial lakes. Paulding, Roselms, Fulton, Latty, and Toledo soils are dominant in these areas, where clayey sediment was deposited by the glacial lakes in the central and eastern parts of the county. Hoytville, Nappanee, and St. Clair soils are dominant in the western part of the county, where lake action has leveled the topography and modified the till.

The uniformity of the landscape in Paulding County is broken only by the dissecting nature of the Auglaize and Maumee Rivers and their tributaries. These rivers and their tributaries are responsible for most of the gently sloping to steep relief in the county. The gently sloping areas are typically associated with the tributaries and in areas where small intermittent drainageways occur. The strongly sloping to steep areas are typically adjacent to the Auglaize and Maumee Rivers and their major tributaries (fig. 2). The better drained Broughton, Fulton, Lucas, Nappanee, Roselms, and St. Clair soils are more prevalent in these areas, where the downcutting nature of the streams and rivers has resulted in more relief and better drainage. Dunes and remnants of glacial lake shorelines, called beach ridges, are responsible for other breaks in the uniformity of the landscape. Belmore, Ottokee, and Tedrow soils are associated with these landforms.

Paulding County is drained by the Auglaize and Maumee Rivers, although most of the county drains into their tributaries. The Auglaize River watershed makes up about three-fourths of the county. Principal tributaries to the Auglaize River are Blue Creek, Flatrock Creek, the Little Auglaize River, Middle Creek, Prairie Creek, and Six Mile Creek. The Maumee River watershed drains only the northwestern part of the county. Its principal tributaries

Figure 2.—A steep slope along a stream. Erosion slows soil formation and hinders the establishment of vegetation.

in the county are Gordon Creek, Marie DeLarme Creek, North Creek, and South Creek.

Several alluvial soils are associated with the rivers and their tributaries in Paulding County. Flatrock, Knoxdale, Landes, Medway, and Rossburg soils are dominant on the flood plains along the Auglaize and Maumee Rivers. Major tributaries to these rivers are Flatrock Creek, the Little Auglaize River, and Marie DeLarme Creek. Principal soils along these tributaries are Defiance, Flatrock, Saranac, Shoals, and Wabasha soils. Along minor tributaries and drainageways in the county, where clayey sediments from the uplands have been deposited, are Defiance, Saranac, and Wabasha soils.

Between the flood plains along the Auglaize and Maumee Rivers and the broad upland lake plains are remnants of old alluvium or outwash that was deposited by the downcutting rivers during flood stage. The nature of the downcutting and the deposition of materials have created a stairstep formation of terraces. The loamy Millgrove and Oshtemo soils are the most recently deposited soils on these terraces and are in the closest proximity to the alluvial soils. The loamy substratum phases of the Fulton and Lucas soils are on older stream terraces at a higher elevation. These soils have a relatively thin mantle of clayey lacustrine sediments that were deposited over the old stream alluvium.

Farming

In 1985, there were 780 farms in Paulding County. Farms took up nearly 86 percent of the land. The average size of a farm was about 294 acres (Carter and Hanuschak, 1986). In 1985, the principal crops were soybeans, which were grown on 100,300 acres; corn, grown on 53,100 acres; wheat, grown on 25,000 acres; and hay, grown on 6,200 acres. Other small

grain crops, pasture, corn for silage, and specialty crops were grown on about 40,900 acres (Carter and Hanuschak, 1986).

The major kinds of livestock in the county are beef cattle, hogs, and dairy cattle. Many farms have no livestock (Carter and Hanuschak, 1986).

Natural Resources

Soil is one of the most important natural resources in the county. Cash crops and livestock are the marketable products resulting from stewardship of the soil.

Dolostone, limestone, and clay have all been quarried throughout Paulding County at one time or another. Most of these resources have been of minor extent, mainly because of the relatively thin deposits of materials of sufficiently high quality for wide commercial use.

Clay was an important natural resource for early farmers, who used it in tile manufacturing for drainage purposes and for brick for home construction. Many small areas were utilized as local sources and can still be seen as shallow depressions that are currently being farmed. With the advent of plastic tile and other construction materials, most clay pits and kiln ovens have been abandoned.

Dolostone and limestone are the major components of bedrock in the county. The Antrim shale, the Traverse group, the Dundee limestone, and the Detroit River group formed during the Devonian Age. These formations are in the northern part of the county and are mainly limestone and shale. The Salina group, which formed during the late Silurian Age, is in the southern part of the county. It is mainly limestone (Bownocker, 1920; Ohio Department of Natural Resources, 1998). Limestone has been mined from these formations in several areas of the county; however, only two quarries are still active. These quarries are in the north-central and northeastern parts of the county. They produce aggregate and rock for Portland cement. Most of the limestone in Paulding County is suitable for many agricultural and industrial uses.

Small sand and gravel pits are scattered throughout the county, mostly along rivers and streams. These deposits are limited in size, ranging from 1 to 10 acres.

History

Prior to the arrival of European settlers, the inhabitants of the survey area were members of the Ottawa and Wyandotte tribes. These people grew corn and other crops in small clearings on terraces and flood plains to supplement their diet. The first white family settled on the east bank of the Auglaize River in 1819 (Howe, 1847). Other early settlers built their primitive homes along the banks of the Auglaize River, the Little Auglaize River, the Maumee River, Blue Creek, Flatrock Creek, and Crooked Creek (Morrow and Bashmore, 1892).

Paulding County was created by an act of the Ohio Legislature on February 12, 1820. It was reduced to its present limits by an act of the State Legislature on March 4, 1845. The county was named in honor of John Paulding, a Revolutionary War hero and a native of Peekskill, New York (Overman, 1958).

Paulding was one of the very last counties in Ohio to become thoroughly settled. The area was still heavily forested after most of the timber in surrounding counties had disappeared (Winter, 1917).

The Miami-Erie Canal and the Wabash-Erie Canal from Indiana join in northern Paulding County. These canals were pushed through in the 1840's and helped to open up the country (Izant, 1953).

Early industry consisted of forest products, mainly barrel staves, railroad ties, and cord wood during the canal building days. The shipment of timber began around 1856, and charcoal making had begun by 1860. Some oil was discovered in 1887 in Paulding and to the west (Winter, 1917).

Timbering played a dominant role in the settlement and early development of Paulding County. Agriculture was not developed extensively in the county until methods were devised for draining the extensive level areas of wet, clayey soils. The major period of development was not until the 1870's and 1880's, when the gigantic task of drainage was begun. More than 5,000 miles of ditches, main and subsidiary channels, were cut through this part of Ohio (Izant, 1953).

In the period from 1880 to 1890, the farmers began to build drainage ditches and to install tile drains. This practice continued for several decades and opened the last major virgin areas of land for cultivation. Various crops were grown, including buckwheat, broom corn, tobacco, and grapes (Howe, 1847).

Recreation

Paulding County has many recreational areas (fig. 3). The 44-acre Paulding Ponds Wildlife Area is just south of the village of Paulding, along Flatrock Creek. The area along the Auglaize River in eastern Paulding County has many private fishing camps and several public boat launches. There are also some

Figure 3.—A pond constructed in an area of Broughton silty clay loam, 6 to 12 percent slopes, eroded. Such ponds are used for swimming and fishing and provide water for drinking and for fire protection.

private camping areas and sportsmen's clubs, which provide opportunities for outdoor activities.

The village of Paulding and other smaller villages in the county have parks with athletic fields, playground equipment, and shelter houses. Public schools also provide some of these facilities. There are also a few private or semi-private golf courses.

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, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the National Soil Survey Handbook of the Natural Resources Conservation Service. The soil survey of Paulding County issued October 1960 (Baker and others, 1960) and a report on the geology of the county (Newberry and others, 1874) were among the references used.

Prior to the soil survey modernization, a soil survey review team conducted an evaluation of the 1960 Paulding County soil survey at the request of the Paulding 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 Paulding County soil survey staff. The soil scientists used U.S. Geological Survey topographic maps, at a scale of 1:24,000, to relate land and image features.

A reconnaissance was made by pickup truck before the soil scientists traversed the surface on foot and examined the soils. Areas having the lowest map unit reliability for soil interpretations were examined first. Areas in the northwest and northeast corners of the county and areas of alluvial soils were determined to be the least reliable. In these areas, where the soil pattern is very complex, observations were spaced as closely as 100 yards. In areas of the Latty-Nappanee association and in other areas where the soil pattern is relatively simple, observations were spaced about one-fourth mile apart.

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 flat area would be separated from a depression or a gently sloping knoll or a side slope would be separated from a flat area. In most areas soil examinations along the traverses were made at points 100 to 800 yards apart, depending on the landscape and soil pattern.

Observations of such items as landforms, blown-down trees, vegetation, ditchbanks, and surface colors were made without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation. The soil material was examined to a depth of about 80 inches or to bedrock if within a depth of 80 inches. The pedons described as typical were observed and studied in pits that were dug with shovels and spades.

At the beginning of the survey, sample areas were selected to represent the major landscapes in the county. These areas were then mapped. Extensive notes were taken on the composition of the map units in these preliminary study areas. These notes were modified as mapping progressed, and a final assessment of the composition of the individual map units was made. Some transects were made to determine the composition of map units, especially the Rimer-Fulton complex.

Samples for chemical and physical analyses were taken from representative sites of several of the soils in the survey area. The chemical and physical analyses were made by the Soil Characterization Laboratory, School of Natural Resources, The Ohio State University, Columbus, Ohio. The results of the 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, Bureau of Testing, Soils and Foundation Section, 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 Natural Resources Conservation Service, State Office, Columbus, Ohio.

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

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These areas are called associations. Each association 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 association 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 association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Paulding-Roselms association

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

Setting

Landform: Lake plains
Slope range: 0 to 6 percent
Landscape features: Extensive flat areas and slight rises

Composition

Percent of the survey area: 41
Extent of the soils in the association (fig. 4):
Paulding and similar soils—64 percent
Roselms and similar soils—21 percent
Minor soils—15 percent

Soil Properties and Qualities

Paulding

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas, depressions, drainageways
Parent material: Lacustrine deposits
Texture of the surface layer: Clay
Slope range: 0 to 2 percent
Permeability: Very slow
Available water capacity: Low

Roselms

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Slight rises, knolls, flat areas, backslopes
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay, silty clay loam, or loam
Slope range: 0 to 6 percent
Permeability: Very slow
Available water capacity: Low

Minor Soils

- Broughton and St. Clair soils on knolls and backslopes and in dissected areas along streams
- The loamy Haskins soils on knolls and slight rises

Use and Management

Major use: Cropland
Management concerns: Seasonal wetness, ponding, high clay content, erosion

2. Latty-Nappanee association

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

Setting

Landform: Lake plains
Slope range: 0 to 6 percent
Landscape features: Extensive flat areas and slight rises

Composition

Percent of the survey area: 30

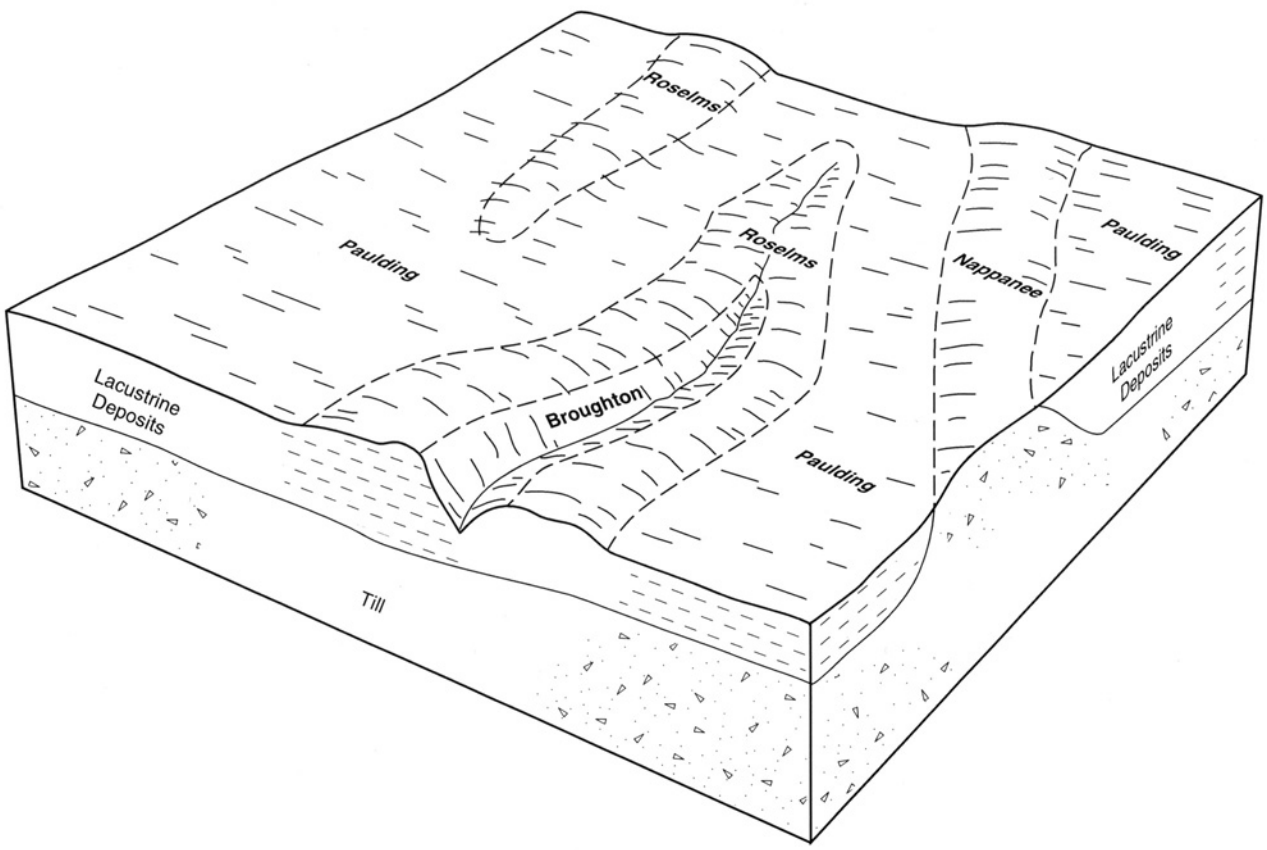

Figure 4.—Typical pattern of soils and parent material in the Paulding-Roselms association.

Extent of the soils in the association (fig. 5):
Latty and similar soils—80 percent
Nappanee and similar soils—14 percent
Minor soils—6 percent

Soil Properties and Qualities

Latty

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Flat areas, depressions, drainageways
Parent material: Lacustrine deposits and the underlying till
Texture of the surface layer: Silty clay or silty clay loam
Slope range: 0 to 2 percent
Permeability: Slow in the upper part of the subsoil and very slow in the lower part of the subsoil and in the substratum
Available water capacity: Moderate

Nappanee

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Slight rises, knolls, flat areas, backslopes
Parent material: Till
Texture of the surface layer: Silty clay loam or loam
Slope range: 0 to 6 percent
Permeability: Slow
Available water capacity: Moderate

Minor Soils

- St. Clair soils on knolls and in dissected areas along streams

Use and Management

Major use: Cropland
Management concerns: Seasonal wetness, ponding, erosion, high clay content

3. Hoytville-Nappanee association

Very deep, nearly level and gently sloping, very poorly drained and somewhat poorly drained soils that formed in till

Setting

Landform: Lake plains
Slope range: 0 to 6 percent
Landscape features: Extensive flat areas and slight rises

Composition

Percent of the survey area: 21
Extent of the soils in the association (fig. 6):
Hoytville and similar soils—82 percent
Nappanee and similar soils—14 percent
Minor soils—4 percent

Soil Properties and Qualities

Hoytville

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Flat areas, depressions, drainageways
Parent material: Till
Texture of the surface layer: Silty clay or silty clay loam
Slope range: 0 to 2 percent
Permeability: Moderately slow in the upper part of the subsoil and slow in the lower part of the subsoil and in the substratum
Available water capacity: Moderate

Nappanee

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Slight rises, knolls, flat areas, backslopes
Parent material: Till
Texture of the surface layer: Silty clay loam or loam
Slope range: 0 to 6 percent
Permeability: Slow
Available water capacity: Moderate

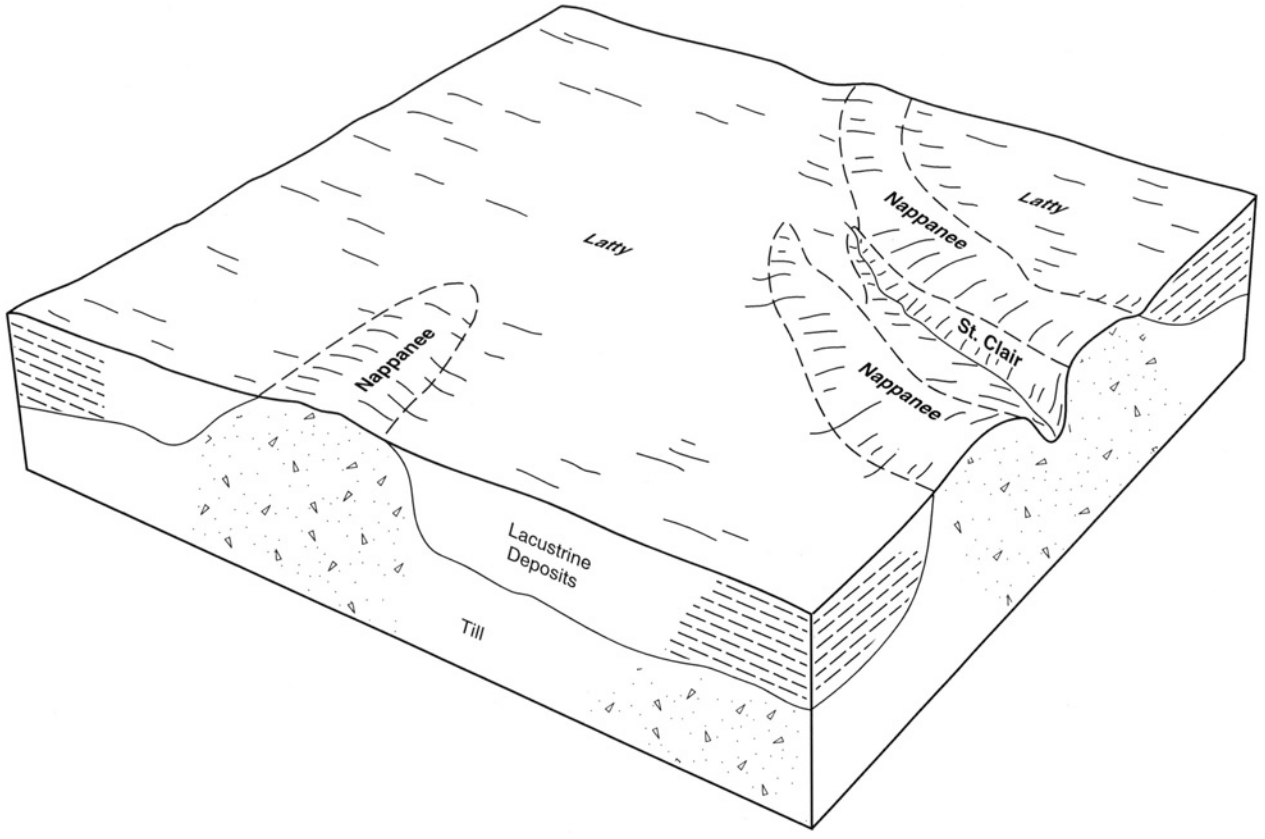

Figure 5.—Typical pattern of soils and parent material in the Latty-Nappanee association.

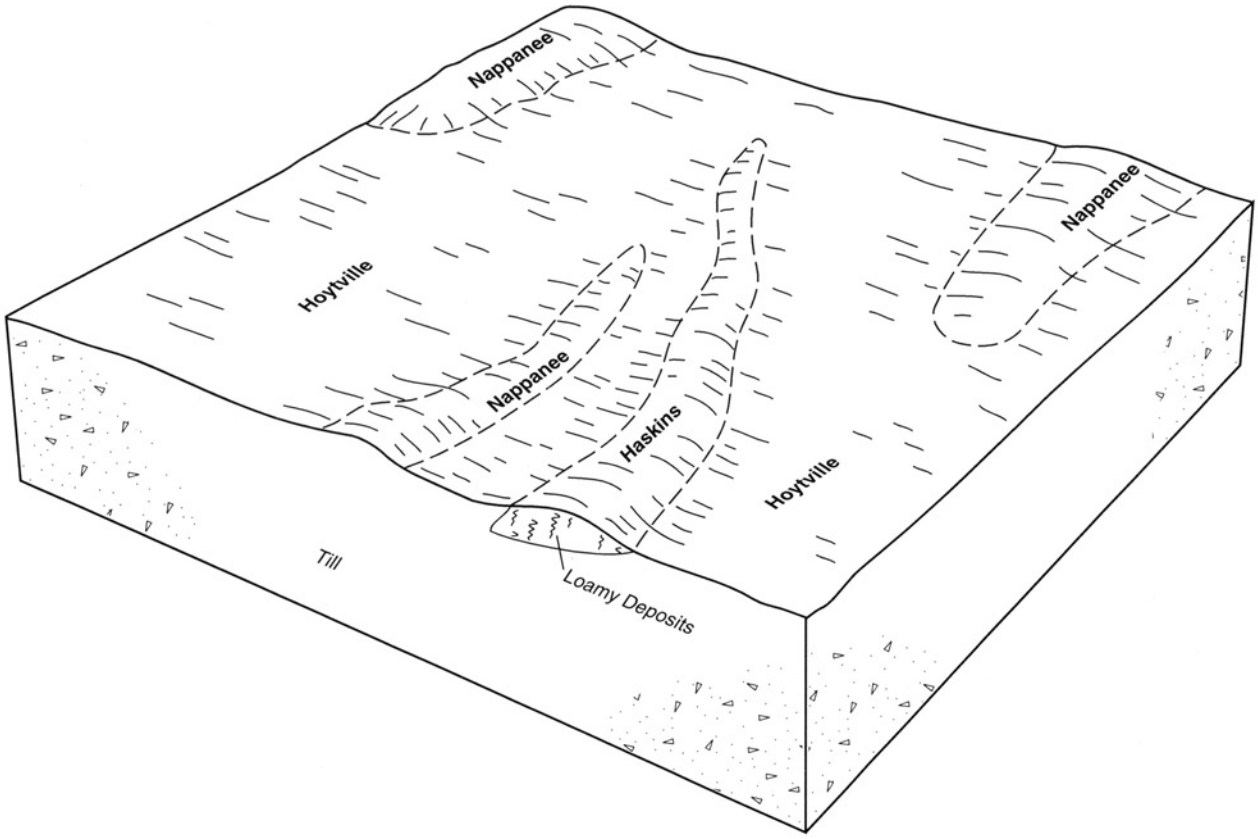

Figure 6.—Typical pattern of soils and parent material in the Hoytville-Nappanee association.

Minor Soils

- The loamy Haskins soils on knolls and slight rises
- Saranac soils on flood plains

Use and Management

Major use: Cropland
Management concerns: Seasonal wetness, ponding, erosion, high clay content

4. Toledo-Fulton association

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

Setting

Landform: Lake plains
Slope range: 0 to 6 percent
Landscape features: Extensive flat areas and slight rises

Composition

Percent of the survey area: 1
Extent of the soils in the association:
Toledo and similar soils—83 percent
Fulton and similar soils—11 percent
Minor soils—6 percent

Soil Properties and Qualities

Toledo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas, drainageways
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay
Slope range: 0 to 2 percent
Permeability: Slow
Available water capacity: Moderate

Fulton

Depth class: Very deep

Drainage class: Somewhat poorly drained
Position on the landform: Slight rises, knolls, flat areas, backslopes
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay loam or loam
Slope range: 0 to 6 percent
Permeability: Slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum
Available water capacity: Moderate

Minor Soils

- The loamy Haskins soils on slight rises and knolls

Use and Management

Major use: Cropland
Management concerns: Seasonal wetness, ponding, erosion, compaction, high clay content

5. Fulton, loamy substratum-Rossburg-Lucas, loamy substratum, association

Very deep, nearly level to strongly sloping, somewhat poorly drained, well drained, and moderately well drained soils that formed in lacustrine deposits overlying loamy glaciofluvial deposits on stream terraces and in alluvium on flood plains

Setting

Landform: Stream terraces and flood plains
Slope range: Generally 0 to 2 percent; 0 to 12 percent in a few areas on terraces
Landscape features: Flat areas and slight rises

Composition

Percent of the survey area: 4
Extent of the soils in the association:
Fulton, loamy substratum, and similar soils—30 percent
Rossburg and similar soils—22 percent
Lucas, loamy substratum, and similar soils—14 percent
Minor soils—34 percent

Soil Properties and Qualities

Fulton, loamy substratum

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Flat areas, slight rises, knolls, and backslopes on stream terraces
Parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Texture of the surface layer: Silty clay loam
Slope range: 0 to 6 percent
Permeability: Slow in the subsoil and moderate in the substratum
Available water capacity: Moderate

Rossburg

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Slight rises and areas adjacent to the stream channel on flood plains
Parent material: Alluvium
Texture of the surface layer: Silt loam
Slope range: 0 to 2 percent
Permeability: Moderate in the subsoil and moderately rapid or rapid in the substratum
Available water capacity: High

Lucas, loamy substratum

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Slight rises, knolls, and backslopes on stream terraces
Parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Texture of the surface layer: Silt loam or silty clay loam
Slope range: 0 to 12 percent
Permeability: Slow in the solum and moderate or moderately slow in the substratum
Available water capacity: Moderate

Minor Soils

- Toledo soils in depressions on stream terraces
- Flatrock, Medway, and Shoals soils on flood plains

Use and Management

Major use: Cropland
Management concerns: Rossburg—occasional flooding; Fulton and Lucas—seasonal wetness, erosion, high content of clay in the subsoil

6. Toledo-Bixler association

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

Setting

Landform: Lake plains
Slope range: 0 to 2 percent
Landscape features: Extensive flat areas, knolls, slight rises, and drainageways

Composition

Percent of the survey area: 3

Extent of the soils in the association:
Toledo and similar soils—51 percent
Bixler and similar soils—20 percent
Minor soils—29 percent

Soil Properties and Qualities

Toledo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Extensive flat areas, drainageways
Parent material: Lacustrine deposits
Texture of the surface layer: Silty clay loam
Slope range: 0 to 2 percent
Permeability: Slow
Available water capacity: Moderate

Bixler

Depth class: Very deep
Drainage class: Somewhat poorly drained
Position on the landform: Slight rises, knolls
Parent material: Lacustrine deposits
Texture of the surface layer: Loamy sand
Slope range: 0 to 2 percent
Permeability: Rapid in the sandy material, moderate in the underlying loamy and silty subsoil and substratum, and slow or very slow in the clayey substratum
Available water capacity: Moderate

Minor Soils

- The loamy Mermill soils in flat areas and in depressions
- The sandy Tedrow soils on beach ridges

Use and Management

Major use: Cropland
Management concerns: Seasonal wetness, ponding, wind erosion, high clay content

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. More information about each map unit is given in the tables described under the heading “Use and Management of the Soils.”

A map unit delineation on a soil 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 and miscellaneous areas 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 noncontrasting, or similar, 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 contrasting, or dissimilar, components. 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, but if intensive use of small areas is planned, 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 lists some of the soil properties and qualities that can affect use and management.

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, Belmore loam, till substratum, 2 to 6 percent slopes, is a phase of the Belmore series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. 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. Rimer-Fulton complex, 0 to 2 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 7 shows the relationship between different geomorphic slope positions and slope terminology. In Paulding County, these terms are applied only in areas that have slopes of more than 2 percent. More detailed definitions of these landform components are in the Glossary.

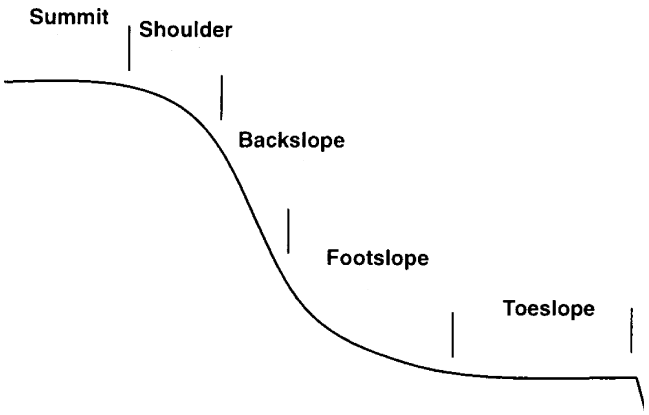

Figure 7.—Diagram showing the relationship between slope position and slope terminology.

BeB—Belmore loam, till substratum, 2 to 6 percent slopes

Setting

Landform: Lake plains, beach ridges on lake plains
Position on the landform: Knolls, backslopes
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 6 inches—brown, friable loam
Subsoil:
6 to 39 inches—dark yellowish brown and dark brown, friable and firm loam and clay loam
Substratum:
39 to 46 inches—brown, firm gravelly coarse sandy loam
46 to 75 inches—brown, very friable sandy loam with thin strata of loamy sand
75 to 80 inches—brown, very firm clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Well drained
Kind of water table: Perched
Depth to the water table: 3 to 6 feet
Permeability: Moderately rapid in the solum, rapid in the loamy and gravelly substratum, and slow in the till
Dominant parent material: Beach deposits overlying till
Content of organic matter in the surface layer: 1 to 3 percent
Available water capacity: About 7.0 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 17 milliequivalents per 100 grams in the surface layer
Special feature: Unweathered till between depths of 60 and 80 inches

Composition

Belmore and similar soils: 88 percent
Dissimilar components: 12 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 40 to 60 inches
- Soils that have till at a depth of more than 80 inches
- Soils that have an eroded surface layer of clay loam
- Moderately well drained soils that have more clay between depths of 20 and 40 inches

Dissimilar components:
- Mermill soils in depressions
- Millgrove soils in depressions
- Somewhat poorly drained soils in the flatter 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BkA—Bixler loamy sand, clayey substratum, 0 to 2 percent slopes

Setting

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

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, very friable loamy sand
Subsurface layer:
10 to 28 inches—yellowish brown, mottled, very friable loamy sand
Subsoil:
28 to 36 inches—grayish brown, mottled, friable sandy loam
36 to 46 inches—grayish brown, mottled, firm silt loam with thin strata of silty clay loam
Substratum:
46 to 74 inches—dark yellowish brown, mottled, friable silt loam with thin strata of very fine sandy loam
74 to 80 inches—dark yellowish brown, mottled, firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Rapid in the sandy material, moderate in the underlying loamy and silty subsoil and substratum, and slow or very slow in the clayey substratum
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Potential for frost action: High
Available water capacity: About 7.0 inches to a depth of 60 inches
Cation-exchange capacity: 2 to 15 milliequivalents per 100 grams in the surface layer
Special features: A clayey substratum between depths of 60 and 80 inches; the surface layer may be susceptible to wind erosion.

Composition

Bixler and similar soils: 92 percent
Dissimilar components: 8 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have more clay in the substratum
- Soils that have a surface layer of loamy sand and are less than 20 inches thick in the upper part of the subsoil
- Soils that have a surface layer of loamy fine sand
- Soils that are loamy sand or sand to a depth of more than 80 inches

Dissimilar components:
- Very poorly drained 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BrB2—Broughton silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Knolls, backslopes
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown, firm silty clay loam
Subsoil:
6 to 13 inches—dark yellowish brown, very firm clay
13 to 17 inches—dark yellowish brown, mottled, very firm clay
17 to 26 inches—yellowish brown, mottled, very firm clay
Substratum:
26 to 80 inches—yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 4.1 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Broughton and similar soils: 93 percent
Dissimilar components: 7 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam or loam
- Soils that have more clay in the severely eroded surface layer
- Somewhat poorly drained soils

Dissimilar components:
- Paulding 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BrC2—Broughton silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 8 inches—brown, firm silty clay loam
Subsoil:
8 to 15 inches—yellowish brown, very firm clay
15 to 18 inches—yellowish brown, mottled, very firm clay
18 to 27 inches—dark yellowish brown, mottled, very firm clay
Substratum:
27 to 80 inches—dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 4.3 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Broughton and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have more clay in the severely eroded surface layer
- Soils that have a surface layer of silt loam
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BrD2—Broughton silty clay loam, 12 to 18 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Dissected areas along streams
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 6 inches—brown, very firm silty clay loam
Subsoil:
6 to 12 inches—yellowish brown, very firm clay
12 to 16 inches—yellowish brown, mottled, very firm clay
16 to 21 inches—dark yellowish brown, mottled, very firm clay
Substratum:
21 to 80 inches—dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 4.1 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Broughton and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have more clay in the severely eroded surface layer
- Soils that have a surface layer of silt loam
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BrE2—Broughton silty clay loam, 18 to 35 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 4 inches—very dark grayish brown, firm silty clay loam
Subsoil:
4 to 8 inches—pale brown, firm silty clay loam
8 to 13 inches—yellowish brown, very firm clay
13 to 22 inches—dark yellowish brown and yellowish brown, mottled, very firm clay
Substratum:
22 to 80 inches—brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)

Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 4.5 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Broughton and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have more clay in the severely eroded surface layer
- Soils that have a surface layer of silt loam
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BsC3—Broughton silty clay, 6 to 12 percent slopes, severely eroded

Setting

Landform: Lake plains
Position on the landform: Dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Most of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 5 inches—brown, very firm silty clay
Subsoil:
5 to 12 inches—yellowish brown, mottled, very firm clay
12 to 27 inches—brown and yellowish brown, mottled, very firm clay
27 to 34 inches—dark yellowish brown, mottled, very firm clay
Substratum:
34 to 80 inches—dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Shrink-swell potential: High throughout the profile
Available water capacity: About 3.8 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 37 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Broughton and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have less clay in the eroded surface layer
- Soils that have till at a depth of 40 to 80 inches
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

BsD3—Broughton silty clay, 12 to 18 percent slopes, severely eroded

Setting

Landform: Lake plains
Position on the landform: Dissected areas along streams
Size of areas: 5 to 20 acres
Special feature: Most of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 5 inches—yellowish brown, very firm silty clay
Subsoil:
5 to 11 inches—yellowish brown, very firm clay
11 to 25 inches—dark yellowish brown, mottled, very firm clay
Substratum:
25 to 80 inches—dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 1.5 to 3.0 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Shrink-swell potential: High throughout the profile
Available water capacity: About 3.7 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 37 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Broughton and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 40 to 80 inches
- Soils that have less clay in the eroded surface layer
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Db—Defiance silty clay loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, flat areas
Slope range: 0 to 2 percent
Size of areas: 10 to 40 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, firm silty clay loam
Subsoil:
8 to 48 inches—brown, grayish brown, and yellowish brown, mottled, firm silty clay loam, silty clay, and clay
Substratum:
48 to 80 inches—grayish brown, mottled, firm clay with thin strata of clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Apparent
Depth to the water table: 1.0 to 2.5 feet
Flooding duration: Brief
Permeability: Slow
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 2 to 3 percent

Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 8.5 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

Defiance and similar soils: 93 percent
Dissimilar components: 7 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 components:
- Saranac soils in depressions and old stream channels

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

Dc—Defiance silty clay loam, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas, slight rises
Slope range: 0 to 2 percent
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, firm silty clay loam
Subsoil:
8 to 34 inches—grayish brown and yellowish brown, mottled, firm silty clay
Substratum:
34 to 80 inches—grayish brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Apparent
Depth to the water table: 1.0 to 2.5 feet
Flooding duration: Brief
Permeability: Slow
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 8.3 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

Defiance and similar soils: 93 percent
Dissimilar components: 7 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 components:
- Wabasha soils in depressions and old stream channels

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

Fb—Flatrock silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Size of areas: 10 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, friable silt loam
Subsoil:
10 to 15 inches—dark yellowish brown, friable silt loam
15 to 38 inches—dark yellowish brown, mottled, friable silt loam and loam
Substratum:
38 to 80 inches—yellowish brown, mottled, friable loam with strata of silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Apparent
Depth to the water table: 1.5 to 3.0 feet
Flooding duration: Brief
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 1 to 3 percent
Available water capacity: About 11.0 inches to a depth of 60 inches
Cation-exchange capacity: 9 to 20 milliequivalents per 100 grams in the surface layer

Composition

Flatrock and similar soils: 97 percent
Dissimilar components: 3 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have a surface layer of loam
- Well drained soils
- Somewhat poorly drained soils

Dissimilar components:
- Areas that are subject to only rare flooding; intermixed throughout 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Fc—Flatrock silt loam, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Size of areas: 10 to 80 acres

Typical Profile

Surface layer:
0 to 13 inches—brown, friable silt loam
Subsoil:
13 to 18 inches—yellowish brown, mottled, friable silt loam
18 to 44 inches—dark yellowish brown, mottled, firm loam
Substratum:
44 to 80 inches—yellowish brown, mottled, friable loam with thin strata of silt loam and fine sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Apparent
Depth to the water table: 1.5 to 3.0 feet
Flooding duration: Brief
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 1 to 3 percent
Available water capacity: About 11.3 inches to a depth of 60 inches
Cation-exchange capacity: 9 to 20 milliequivalents per 100 grams in the surface layer

Composition

Flatrock and similar soils: 97 percent
Dissimilar components: 3 percent

Inclusions

Similar soils:
- Soils that have a surface layer of loam
- Well drained soils
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha soils in old stream channels

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

FtA—Fulton loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, flat areas
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable loam
Subsoil:
10 to 37 inches—yellowish brown, mottled, firm and very firm clay
37 to 42 inches—yellowish brown, mottled, very firm silty clay
Substratum:
42 to 80 inches—olive brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.5 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 24 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the subsoil and substratum

Composition

Fulton and similar soils: 94 percent
Dissimilar components: 6 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of silty clay loam or clay loam
- Soils that have less clay in the subsoil

Dissimilar components:
- Latty and Toledo 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
- "Forestland" 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: 5 to 50 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, firm silty clay loam
Subsoil:
10 to 38 inches—yellowish brown and brown, mottled, firm and very firm silty clay
38 to 47 inches—yellowish brown, mottled, very firm silty clay
Substratum:
47 to 80 inches—yellowish brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep

Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.5 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

Fulton and similar soils: 94 percent
Dissimilar components: 6 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of loam or silt loam
- Soils that have less clay in the subsoil

Dissimilar components:
- Latty and Toledo 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

FuB2—Fulton silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Knolls, backslopes
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 7 inches—brown, firm silty clay loam
Subsoil:
7 to 31 inches—yellowish brown and dark yellowish brown, mottled, firm and very firm silty clay
31 to 38 inches—dark yellowish brown, mottled, very firm silty clay
Substratum:
38 to 80 inches—dark yellowish brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.1 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

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

Inclusions

Similar soils:
- Soils that have till at a depth of 40 to 80 inches
- Soils that have more clay in the subsoil and substratum
- Moderately well drained soils

Dissimilar components:
- Latty 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

FxA—Fulton silty clay loam, loamy substratum, 0 to 2 percent slopes

Setting

Landform: Lake plains, stream terraces
Position on the landform: Flat areas, slight rises
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, firm silty clay loam
Subsoil:
9 to 36 inches—yellowish brown and grayish brown, mottled, very firm silty clay
36 to 44 inches—yellowish brown, mottled, friable silty clay loam
Substratum:
44 to 80 inches—yellowish brown, mottled, friable silt loam with strata of clay loam and fine sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Slow in the subsoil and moderate in the substratum
Dominant parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil
Potential for frost action: High
Available water capacity: About 8.1 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special features: A loamy substratum between depths of 40 and 80 inches; a high content of clay in the surface layer and subsoil

Composition

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

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam
- Soils that have carbonates at a depth of less than 40 inches
- Soils that have more clay and less sand in the substratum
- Moderately well drained soils

Dissimilar components:
- Toledo 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

FxB—Fulton silty clay loam, loamy substratum, 2 to 6 percent slopes

Setting

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

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable silty clay loam
Subsoil:
8 to 31 inches—yellowish brown and brown, mottled, firm silty clay
31 to 38 inches—yellowish brown, mottled, firm silty clay
38 to 51 inches—gray, mottled, firm silty clay
Substratum:
51 to 80 inches—yellowish brown, mottled, friable silt loam with thin strata of clay loam and loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Slow in the subsoil and moderate in the substratum

Dominant parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil
Potential for frost action: High
Available water capacity: About 7.7 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special features: A loamy substratum between depths of 40 and 80 inches; a high content of clay in the surface layer and subsoil

Composition

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

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam
- Soils that have carbonates at a depth of less than 40 inches
- Soils that have more clay and less sand in the substratum
- Moderately well drained soils

Dissimilar components:
- Toledo 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Gr—Granby loamy sand, clayey substratum

Setting

Landform: Lake plains
Position on the landform: Flat areas, depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 40 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 10 inches—very dark brown, very friable loamy sand

Subsurface layer:
10 to 13 inches—very dark brown, mottled, very friable loamy sand

Subsoil:
13 to 37 inches—dark gray and grayish brown, mottled, very friable sand and loamy sand

Substratum:
37 to 61 inches—grayish brown, mottled, loose sand
61 to 80 inches—dark gray, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Poorly drained and very poorly drained
Kind of water table: Apparent
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Rapid in the sandy solum and substratum and slow or very slow in the underlying clayey substratum
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 3 to 6 percent
Available water capacity: About 5.1 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 15 milliequivalents per 100 grams in the surface layer
Special features: This soil is a hydric soil. Also, the surface layer may be susceptible to wind erosion, and a clayey substratum is between depths of 60 and 80 inches.

Composition

Granby and similar soils: 92 percent
Dissimilar components: 8 percent

Inclusions

Similar soils:
- Soils that have less clay in the clayey substratum
- Soils that have a surface layer of fine sandy loam
- Soils that have clayey material at a depth of 20 to 60 inches

Dissimilar components:
- Tedrow 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
- “Forestland” section

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

HaA—Haskins loamy sand, 0 to 2 percent slopes

Setting

Landform: Lake plains, beach ridges on lake plains
Position on the landform: Slight rises, knolls
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, very friable loamy sand
Subsurface layer:
9 to 15 inches—brown, mottled, very friable loamy sand
Subsoil:
15 to 34 inches—dark yellowish brown and yellowish brown, mottled, friable fine sandy loam
34 to 40 inches—dark yellowish brown, mottled, very firm silty clay
Substratum:
40 to 80 inches—dark yellowish brown, mottled, very firm silty clay and clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 20 and 40 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Moderately rapid or rapid in the sandy material, moderate in the loamy subsoil, and slow or very slow in the underlying material
Dominant parent material: Loamy deposits and the underlying lacustrine deposits or till
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 6.2 inches to a depth of 60 inches
Cation-exchange capacity: 2 to 15 milliequivalents per 100 grams in the surface layer
Special feature: The surface layer may be susceptible to wind erosion.

Composition

Haskins and similar soils: 88 percent
Dissimilar components: 12 percent

Inclusions

Similar soils:
- Soils that have a surface layer of sandy loam
- Soils that have a darker surface layer
- Soils that have less clay in the lower part of the subsoil and in the substratum
- Soils that have a surface layer of fine sandy loam
- Soils that have thicker surface and subsurface layers of loamy sand

Dissimilar components:
- Mermill soils in depressions and drainageways
- Nappanee and Fulton soils on slight rises and low knolls

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

HkA—Haskins loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, knolls
Size of areas: 2 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable loam
Subsoil:
9 to 35 inches—yellowish brown and grayish brown, mottled, friable clay loam
35 to 44 inches—yellowish brown, mottled, very firm silty clay
Substratum:
44 to 80 inches—yellowish brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 20 and 40 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet

Permeability: Moderate in the loamy deposits and slow or very slow in the underlying material
Dominant parent material: Loamy deposits and the underlying till or lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 7.4 inches to a depth of 60 inches
Cation-exchange capacity: 6 to 15 milliequivalents per 100 grams in the surface layer

Composition

Haskins and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have less clay in the lower part of the subsoil and in the substratum
- Soils that have a surface layer of sandy loam
- Soils that have more clay in the subsoil

Dissimilar components:
- Mermill 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

HkB—Haskins loam, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Knolls, backslopes
Size of areas: 2 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable loam
Subsoil:
9 to 30 inches—dark yellowish brown, mottled, friable clay loam and loam
30 to 40 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
40 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 20 and 40 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Moderate in the loamy deposits and slow or very slow in the underlying material
Dominant parent material: Loamy deposits and the underlying till or lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 7.1 inches to a depth of 60 inches
Cation-exchange capacity: 6 to 15 milliequivalents per 100 grams in the surface layer

Composition

Haskins and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have less clay in the lower part of the subsoil and in the substratum
- Soils that have a surface layer of sandy loam
- Moderately well drained soils
- Soils that have more clay in the subsoil

Dissimilar components:
- Mermill 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Hs—Hoytville silty clay loam

Setting

Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 50 to 100 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 9 inches—very dark gray, firm silty clay loam
Subsoil:
9 to 39 inches—dark grayish brown and grayish brown, mottled, firm clay
39 to 46 inches—grayish brown, mottled, firm silty clay
Substratum:
46 to 80 inches—dark yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 36 and 55 inches
Drainage class: Very poorly drained
Kind of water table: Perched
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Moderately slow in the upper part of the subsoil and slow in the lower part of the subsoil and in the substratum
Dominant parent material: Till
Content of organic matter in the surface layer: 3 to 6 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.3 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 35 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout

Composition

Hoytville and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have a lighter colored surface layer
- Soils that have till at a depth of 60 to 80 inches
- Soils that have less clay in the subsoil
- Soils that have a surface layer of silty clay or clay loam

Dissimilar components:
- Nappanee 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Ht—Hoytville silty clay

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, drainageways, depressions
Slope range: 0 to 2 percent
Size of areas: 25 to more than 1,000 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 9 inches—very dark gray, firm silty clay
Subsoil:
9 to 39 inches—dark gray and gray, mottled, firm silty clay
39 to 46 inches—dark yellowish brown, mottled, very firm silty clay loam
Substratum:
46 to 80 inches—dark yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 36 and 55 inches
Drainage class: Very poorly drained
Kind of water table: Perched
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Moderately slow in the upper part of the subsoil and slow in the lower part of the subsoil and in the substratum
Dominant parent material: Till
Content of organic matter in the surface layer: 3 to 6 percent

Shrink-swell potential: High throughout the profile
Potential for frost action: High
Available water capacity: About 5.9 inches to a depth of 60 inches
Cation-exchange capacity: 24 to 40 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout

Composition

Hoytville and similar soils: 90 percent
Dissimilar components: 10 percent

Inclusions

Similar soils:
- Soils that have a lighter colored surface layer
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of clay or silty clay loam

Dissimilar components:
- Nappanee 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Kn—Knoxdale silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Size of areas: 10 to 30 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam
Subsoil:
9 to 20 inches—dark yellowish brown, friable silt loam
20 to 35 inches—dark yellowish brown, mottled, friable loam
Substratum:
35 to 56 inches—dark yellowish brown, friable loam with thin strata of silt loam
56 to 80 inches—yellowish brown, very friable, stratified sandy loam and loam with thin layers of loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Well drained
Kind of water table: Apparent
Depth to the water table: 3 to 6 feet
Flooding duration: Brief
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 1 to 3 percent
Available water capacity: About 10.8 inches to a depth of 60 inches
Cation-exchange capacity: 9 to 20 milliequivalents per 100 grams in the surface layer

Composition

Knoxdale and similar soils: 97 percent
Dissimilar components: 3 percent

Inclusions

Similar soils:
- Soils that have a darker surface layer
- Soils that have more sand and less clay in the subsoil and substratum
- Moderately well drained soils
- Somewhat poorly drained soils

Dissimilar components:
- Areas that are subject to only rare flooding; 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

La—Landes loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Areas adjacent to the stream channel, slight rises

Slope range: 0 to 6 percent
Size of areas: 10 to 30 acres

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable loam
Subsurface layer:
10 to 18 inches—very dark grayish brown, friable loam
Subsoil:
18 to 26 inches—brown, friable loam
Substratum:
26 to 80 inches—dark yellowish brown, friable and very friable loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Well drained
Depth to the water table: More than 6 feet
Flooding duration: Brief
Permeability: Moderately rapid in the solum and rapid in the substratum
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 1 to 2 percent
Available water capacity: About 8.2 inches to a depth of 60 inches
Cation-exchange capacity: 8 to 17 milliequivalents per 100 grams in the surface layer
Special feature: The soil is calcareous throughout.

Composition

Landes and similar soils: 100 percent

Inclusions

Similar soils:
- Soils that have a lighter colored surface layer
- Soils that have a surface layer of silt loam
- Soils that have more clay in the subsoil
- Moderately well drained soils that have a darker surface layer

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

Lb—Latty silty clay loam

Setting

Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 10 to 100 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, firm silty clay loam
Subsoil:
7 to 32 inches—grayish brown, mottled, very firm silty clay
32 to 45 inches—yellowish brown, mottled, very firm silty clay
Substratum:
45 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a high content of clay throughout
Drainage class: Very poorly drained
Kind of water table: Perched
Water table depth: 0.5 foot above to 1.0 foot below the surface
Permeability: Slow in the subsoil and very slow in the substratum
Dominant parent material: Lacustrine deposits or lacustrine deposits and the underlying till
Content of organic matter in the surface layer: 3 to 5 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 6.9 inches to a depth of 60 inches
Cation-exchange capacity: 20 to 34 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout; till between depths of 32 and 80 inches

Composition

Latty and similar soils: 90 percent
Dissimilar components: 10 percent

Inclusions

Similar soils:
- Soils that contain more rock fragments in the

subsoil and that have till at a depth of 40 to 60 inches
- Soils that have a darker surface layer
- Soils that have a surface layer of silty clay or clay

Dissimilar components:
- Fulton and Nappanee 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Lc—Latty silty clay

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 50 to more than 1,000 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 11 inches—dark grayish brown, very firm silty clay

Subsoil:
11 to 42 inches—grayish brown, gray, and olive gray, mottled, very firm clay
42 to 48 inches—yellowish brown, mottled, very firm clay

Substratum:
48 to 80 inches—yellowish brown and brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a high content of clay throughout
Drainage class: Very poorly drained
Kind of water table: Perched
Water table depth: 0.5 foot above to 1.0 foot below the surface
Permeability: Slow in the upper part of the subsoil and very slow in the lower part of the subsoil and in the substratum
Dominant parent material: Lacustrine deposits or lacustrine deposits and the underlying till
Content of organic matter in the surface layer: 3 to 5 percent
Shrink-swell potential: High throughout the profile
Potential for frost action: High
Available water capacity: About 6.4 inches to a depth of 60 inches
Cation-exchange capacity: 22 to 40 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout; till between depths of 40 and 80 inches

Composition

Latty and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil and substratum
- Soils that have a darker surface layer
- Soils that have a surface layer of silty clay loam or clay

Dissimilar components:
- Fulton and Nappanee 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

LtA—Lucas silt loam, loamy substratum, 0 to 2 percent slopes

Setting

Landform: Lake plains, stream terraces
Position on the landform: Slight rises, knolls
Size of areas: 2 to 25 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, friable silt loam

Subsoil:
9 to 28 inches—yellowish brown, firm silty clay

28 to 48 inches—yellowish brown, mottled, firm silty clay

Substratum:

48 to 80 inches—dark yellowish brown, mottled, friable clay loam and loam with thin strata of sandy loam and fine sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2.5 to 4.0 feet
Permeability: Slow in the solum and moderate or moderately slow in the substratum
Dominant parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil
Available water capacity: About 8.4 inches to a depth of 60 inches
Cation-exchange capacity: 9 to 19 milliequivalents per 100 grams in the surface layer
Special features: A high content of clay in the subsoil; a loamy substratum between depths of 40 and 60 inches

Composition

Lucas and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:

- Soils that have a surface layer of silty clay loam
- Soils that have a loamy substratum at a depth of less than 40 inches
- Somewhat poorly drained soils

Dissimilar components:

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

LuB2—Lucas silty clay loam, loamy substratum, 2 to 6 percent slopes, eroded

Setting

Landform: Lake plains, stream terraces
Position on the landform: Knolls, backslopes
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:

0 to 7 inches—brown, friable silty clay loam

Subsoil:

7 to 25 inches—yellowish brown, firm silty clay
25 to 44 inches—yellowish brown and brown, mottled, firm silty clay

Substratum:

44 to 80 inches—brown, mottled, friable clay loam with strata of silt loam and loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2.5 to 4.0 feet
Permeability: Slow in the solum and moderate or moderately slow in the substratum
Dominant parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil
Available water capacity: About 8.0 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 27 milliequivalents per 100 grams in the surface layer
Special features: A high content of clay in the surface layer and subsoil; a loamy substratum between depths of 40 and 60 inches

Composition

Lucas and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:

- Soils that have a surface layer of silt loam
- Soils that have a severely eroded surface layer of silty clay
- Somewhat poorly drained soils

Dissimilar components:
- Toledo 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

LuC2—Lucas silty clay loam, loamy substratum, 6 to 12 percent slopes, eroded

Setting

Landform: Lake plains, stream terraces
Position on the landform: Backslopes
Size of areas: 5 to 25 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 7 inches—brown, friable silty clay loam
Subsoil:
7 to 17 inches—yellowish brown, firm silty clay
17 to 36 inches—yellowish brown, mottled, firm silty clay
Substratum:
36 to 80 inches—yellowish brown, mottled, friable clay loam with strata of silt loam and loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2.5 to 4.0 feet
Permeability: Slow in the solum and moderate or moderately slow in the substratum
Dominant parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil
Available water capacity: About 8.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 27 milliequivalents per 100 grams in the surface layer
Special features: A high content of clay in the surface layer and subsoil; a loamy substratum between depths of 36 and 60 inches

Composition

Lucas and similar soils: 93 percent
Dissimilar components: 7 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam
- Soils that have a severely eroded surface layer of silty clay
- Somewhat poorly drained soils
- Soils that have slopes of 12 to 18 percent

Dissimilar components:
- Toledo 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

Md—Medway silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Flat areas
Slope range: 0 to 2 percent
Size of areas: 5 to 80 acres

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable silt loam
Subsurface layer:
10 to 19 inches—very dark grayish brown, friable silt loam
Subsoil:
19 to 41 inches—brown and dark yellowish brown, mottled, friable silt loam and loam
41 to 47 inches—yellowish brown, mottled, friable fine sandy loam
Substratum:
47 to 58 inches—dark yellowish brown, mottled, very friable sandy loam

58 to 80 inches—yellowish brown, mottled, loose gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Apparent
Depth to the water table: 1.5 to 3.0 feet
Flooding duration: Brief
Permeability: Moderate in the upper part of the subsoil and moderate or moderately rapid in the lower part of the subsoil and in the substratum
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 3 to 6 percent
Potential for frost action: High
Available water capacity: About 10.1 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 28 milliequivalents per 100 grams in the surface layer

Composition

Medway and similar soils: 100 percent

Inclusions

Similar soils:
- Soils that have more silt in the subsoil
- Soils that have a lighter colored surface layer
- Somewhat poorly drained soils
- Well drained soils

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

Me—Mermill loam

Setting

Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 5 to 40 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, friable loam
Subsoil:
9 to 37 inches—gray and grayish brown, mottled, friable clay loam
37 to 44 inches—grayish brown, mottled, firm silty clay loam
Substratum:
44 to 80 inches—dark yellowish brown, mottled, firm silty clay loam and silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 20 and 40 inches
Drainage class: Very poorly drained
Kind of water table: Perched
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Moderate in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum
Dominant parent material: Loamy deposits and the underlying till or lacustrine deposits
Content of organic matter in the surface layer: 3 to 6 percent
Potential for frost action: High
Available water capacity: About 7.7 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 26 milliequivalents per 100 grams in the surface layer
Special feature: Hydric soil

Composition

Mermill and similar soils: 92 percent
Dissimilar components: 8 percent

Inclusions

Similar soils:
- Soils that have less clay in the lower part of the subsoil and in the substratum
- Soils that have more sand and less clay in the subsoil
- Soils that have a thicker surface layer
- Soils that have a surface layer of fine sandy loam
- Soils that have more clay in the subsoil

Dissimilar components:
- 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Mg—Millgrove loam, till substratum

Setting

Landform: Stream terraces, lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 5 to 40 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable loam
Subsurface layer:
10 to 15 inches—very dark grayish brown, mottled, firm loam
Subsoil:
15 to 36 inches—dark gray, mottled, friable and firm sandy clay loam
36 to 50 inches—dark grayish brown, mottled, very friable gravelly sandy loam
Substratum:
50 to 61 inches—dark grayish brown, mottled, friable, stratified gravelly sandy loam, loam, and silt loam
61 to 80 inches—dark grayish brown, mottled, firm clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Very poorly drained
Kind of water table: Perched
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Moderate in the loamy solum; moderately rapid in the sandy, gravelly, and loamy substratum; and slow in the underlying till
Dominant parent material: Loamy material and the underlying stratified sandy, gravelly, and loamy deposits overlying till
Content of organic matter in the surface layer: 3 to 8 percent
Potential for frost action: High
Available water capacity: About 8.6 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 32 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; till between depths of 60 and 80 inches

Composition

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

Inclusions

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

Dissimilar components:
- Somewhat poorly drained 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NnA—Nappanee loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, flat areas
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable loam
Subsoil:
10 to 27 inches—yellowish brown and brown, mottled, firm and very firm silty clay
27 to 36 inches—dark yellowish brown, mottled, very firm silty clay loam
Substratum:
36 to 80 inches—dark yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 50 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1 to 2 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.0 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 22 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the subsoil and substratum

Composition

Nappanee and similar soils: 93 percent
Dissimilar components: 7 percent

Inclusions

Similar soils:
- Soils that have carbonates at a depth of more than 40 inches
- Soils that have less clay in the lower part of the subsoil and in the substratum
- Soils that have a surface layer of silt loam or clay loam
- Soils that have less clay in the subsoil

Dissimilar components:
- Latty 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

NpA—Nappanee silty clay loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, flat areas
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silty clay loam
Subsoil:
10 to 27 inches—yellowish brown and brown, mottled, firm and very firm silty clay
27 to 35 inches—dark yellowish brown, mottled, very firm silty clay loam
Substratum:
35 to 80 inches—dark yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 50 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1 to 2 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 6.8 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

Nappanee and similar soils: 90 percent
Dissimilar components: 10 percent

Inclusions

Similar soils:
- Soils that have less sand and a lower content of rock fragments in the subsoil and substratum
- Soils that have a surface layer of clay loam or loam

Dissimilar components:
- Latty 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

NpB—Nappanee silty clay loam, 2 to 6 percent slopes

Setting

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

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown, friable silty clay loam
Subsoil:
10 to 28 inches—yellowish brown, mottled, firm silty clay
28 to 46 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
46 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 50 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1 to 2 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 6.9 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

Nappanee and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam
- Eroded soils
- Soils that have a darker surface layer
- Moderately well drained soils

Dissimilar components:
- Latty 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

NpB2—Nappanee silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Knolls, backslopes
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 7 inches—dark grayish brown, firm silty clay loam
Subsoil:
7 to 28 inches—yellowish brown and grayish brown, mottled, firm silty clay
28 to 35 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
35 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 50 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1 to 2 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 6.9 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

Nappanee and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam or loam
- Soils that have a severely eroded surface layer of calcareous silty clay
- Moderately well drained soils

Dissimilar components:
- Latty 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OsB—Oshtemo sandy loam, till substratum, 2 to 6 percent slopes

Setting

Landform: Stream terraces, beach ridges on lake plains
Position on the landform: Knolls, backslopes
Size of areas: 5 to 15 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, friable sandy loam
Subsoil:
8 to 26 inches—brown, mottled, friable sandy loam
26 to 42 inches—brown and dark brown, friable sandy clay loam and very friable coarse sandy loam
42 to 68 inches—yellowish brown, very friable sandy loam
Substratum:
68 to 74 inches—brown, loose very gravelly loamy sand
74 to 80 inches—dark gray, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Well drained
Kind of water table: Perched
Depth to the water table: 3 to 6 feet
Permeability: Moderately rapid in the solum, very rapid in the sandy and gravelly substratum, and slow in the till
Dominant parent material: Loamy and sandy material overlying till
Content of organic matter in the surface layer: 0.5 to 3.0 percent
Available water capacity: About 8.0 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 12 milliequivalents per 100 grams in the surface layer
Special feature: Till between depths of 60 and 80 inches

Composition

Oshtemo and similar soils: 89 percent
Dissimilar components: 11 percent

Inclusions

Similar soils:
- Soils that have more silt and clay, less sand, and a lower content of rock fragments at a depth of 40 to 60 inches
- Soils that have a darker surface layer
- Moderately well drained soils

Dissimilar components:
- Millgrove soils in depressions
- Somewhat poorly drained soils in the flatter positions
- Areas that are subject to only rare flooding; 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

OtB—Ottokee loamy sand, 0 to 6 percent slopes

Setting

Landform: Beach ridges, dunes
Position on the landform: Knolls, rises
Size of areas: 5 to 15 acres
Special feature: This soil is in the highest, most prominent positions on the landscape.

Typical Profile

Surface layer:
0 to 10 inches—dark brown, very friable loamy sand
Subsurface layer:
10 to 23 inches—yellowish brown, loose loamy sand
23 to 35 inches—yellowish brown, mottled, loose loamy sand
Subsoil:
35 to 60 inches—brown and dark yellowish brown, mottled, loose and very friable loamy sand
Substratum:
60 to 80 inches—brown, mottled, loose sand

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Moderately well drained
Kind of water table: Apparent
Depth to the water table: 2.0 to 3.5 feet
Permeability: Rapid
Dominant parent material: Beach deposits or eolian deposits
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Available water capacity: About 5.1 inches to a depth of 60 inches
Cation-exchange capacity: 4 to 12 milliequivalents per 100 grams in the surface layer
Special feature: The surface layer may be susceptible to wind erosion.

Composition

Ottokee and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have more silt and clay, less sand, and a lower content of rock fragments at a depth of 60 to 80 inches
- Soils that have a darker surface layer
- Somewhat poorly drained soils
- Well drained soils

Dissimilar components:
- Granby 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Pc—Paulding clay

Setting

Landform: Lake plains
Position on the landform: Extensive flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 50 to more than 1,000 acres
Special features: Subject to ponding (fig. 8); this soil is in the lowest positions on the landscape.

Typical Profile

Surface layer:
0 to 6 inches—dark gray, very firm clay
Subsoil:
6 to 48 inches—gray, mottled, very firm clay
Substratum:
48 to 80 inches—gray and dark yellowish brown, mottled, very firm and firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Very poorly drained
Kind of water table: Perched

Figure 8.—Planting corn on tilled ridges in areas of Paulding clay minimizes the damage caused by ponding and wetness.

Water table depth: 1 foot above to 0.5 foot below the surface
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 3 to 5 percent
Shrink-swell potential: High throughout the profile
Potential for frost action: High
Available water capacity: About 5.3 inches to a depth of 60 inches
Cation-exchange capacity: 22 to 50 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay in the surface layer

Composition

Paulding and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil and substratum
- Soils that have a darker surface layer
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of silty clay or silty clay loam

Dissimilar components:
- Roselms 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

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

Pt—Pits, quarry

Setting

Landform: Lake plains
Position on the landform: Flat areas
Size of areas: 20 to 50 acres

Component Description

- This map unit consists of an open pit excavation with stockpiled limestone.

Composition

Pits, quarry: 100 percent

RkA—Rimer loamy sand, 0 to 2 percent slopes

Setting

Landform: Lake plains, beach ridges on lake plains
Position on the landform: Slight rises, knolls
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—brown, very friable loamy sand
Subsurface layer:
9 to 17 inches—brown and yellowish brown, very friable loamy sand
17 to 23 inches—yellowish brown, mottled, loose loamy sand
Subsoil:
23 to 33 inches—dark yellowish brown, mottled, friable sandy loam
33 to 45 inches—brown, mottled, very firm silty clay
Substratum:
45 to 80 inches—brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 25 and 40 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Rapid in the sandy material, moderately rapid in the loamy subsoil, and slow or very slow in the underlying material
Dominant parent material: Beach deposits and the underlying lacustrine deposits or till
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 5.7 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 15 milliequivalents per 100 grams in the surface layer
Special feature: The surface layer may be susceptible to wind erosion.

Composition

Rimer and similar soils: 96 percent
Dissimilar components: 4 percent

Inclusions

Similar soils:
- Soils that have less clay in the lower part of the subsoil and in the substratum
- Soils that have a surface layer of fine sandy loam
- Soils that have thinner surface and subsurface layers of loamy sand
- Soils in which the subsoil is loamy sand or sand and the substratum is more than 80 inches thick
- Moderately well drained soils

Dissimilar components:
- Mermill 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RkB—Rimer loamy sand, 2 to 6 percent slopes

Setting

Landform: Lake plains, beach ridges on lake plains
Position on the landform: Knolls, backslopes
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 10 inches—brown, very friable loamy sand

Subsurface layer:
10 to 17 inches—brown, very friable loamy sand
17 to 21 inches—brown, mottled, very friable loamy sand
Subsoil:
21 to 27 inches—yellowish brown, mottled, friable sandy loam that grades to sandy clay loam in the lower part
27 to 33 inches—yellowish brown, mottled, very firm clay
Substratum:
33 to 80 inches—yellowish brown and dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 25 and 40 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Rapid in the sandy material, moderately rapid in the loamy subsoil, and slow or very slow in the underlying material
Dominant parent material: Beach deposits and the underlying lacustrine deposits or till
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 5.4 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 15 milliequivalents per 100 grams in the surface layer
Special feature: The surface layer may be susceptible to wind erosion.

Composition

Rimer and similar soils: 96 percent
Dissimilar components: 4 percent

Inclusions

Similar soils:
- Soils that have less clay in the subsoil and substratum
- Soils that have a surface layer of fine sandy loam
- Soils that have thinner surface and subsurface layers of loamy sand
- Soils in which the subsoil is loamy sand or sand and the substratum is more than 80 inches thick
- Moderately well drained soils

Dissimilar components:
- Mermill 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RmA—Rimer-Fulton complex, 0 to 2 percent slopes

Setting

Landform: Rimer—lake plains, beach ridges on lake plains; Fulton—lake plains
Position on the landform: Rimer—summits, knolls; Fulton—flat areas
Size of areas: 5 to 15 acres

Typical Profile

Rimer

Surface layer:
0 to 8 inches—dark grayish brown, very friable loamy sand
Subsurface layer:
8 to 21 inches—yellowish brown, mottled, very friable loamy sand
Subsoil:
21 to 38 inches—yellowish brown, mottled, friable sandy loam that grades to sandy clay loam in the lower part
38 to 46 inches—light olive brown, mottled, very firm clay
Substratum:
46 to 80 inches—light olive brown, mottled, very firm clay

Fulton

Surface layer:
0 to 8 inches—dark grayish brown, friable loam
Subsoil:
8 to 33 inches—yellowish brown, mottled, firm clay
33 to 39 inches—dark yellowish brown, mottled, very firm silty clay
Substratum:
39 to 80 inches—dark yellowish brown, mottled, very firm silty clay

Soil Properties and Qualities

Rimer

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by clayey materials between depths of 25 and 40 inches
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Rapid in the sandy material, moderately rapid in the loamy subsoil, and slow or very slow in the underlying material
Dominant parent material: Beach deposits and the underlying lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 6.1 inches to a depth of 60 inches
Cation-exchange capacity: 3 to 15 milliequivalents per 100 grams in the surface layer
Special feature: The surface layer may be susceptible to wind erosion.

Fulton

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Slow or very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.2 inches to a depth of 60 inches
Cation-exchange capacity: 14 to 24 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the subsoil and substratum

Composition

Rimer and similar soils: 64 percent
Fulton and similar soils: 30 percent
Dissimilar components: 6 percent

Inclusions

Soils similar to the Rimer soil:
- Soils that have a surface layer of sandy loam
- Soils that have thinner surface and subsurface layers of loamy sand or sand
- Soils that have clayey material at a depth of 40 to 60 inches

Soils similar to the Fulton soil:
- Soils that have a surface layer of clay loam or sandy loam
- Soils that have more clay in the subsoil and substratum

Dissimilar components:
- Latty 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RnA—Roselms loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, knolls
Size of areas: 5 to 20 acres

Typical Profile

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

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum

Potential for frost action: High
Available water capacity: About 5.2 inches to a depth of 60 inches
Cation-exchange capacity: 10 to 20 milliequivalents per 100 grams in the surface layer

Composition

Roselms and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 40 to 60 inches
- Soils that have less clay in the subsoil and substratum
- Soils that have a surface layer of sandy loam or clay loam
- Soils that have slopes of 2 to 6 percent

Dissimilar components:
- Paulding 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RoA—Roselms silty clay loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Flat areas, slight rises
Size of areas: 5 to 200 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, firm silty clay loam
Subsoil:
8 to 32 inches—brown and yellowish brown, mottled, very firm clay
32 to 53 inches—light olive brown, mottled, very firm clay
Substratum:
53 to 80 inches—light olive brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 4.9 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 26 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Roselms and similar soils: 97 percent
Dissimilar components: 3 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 40 to 60 inches
- Soils that have less clay in the subsoil and substratum
- Soils that have a surface layer of loam or silty clay
- Soils that have slopes of 2 to 6 percent

Dissimilar components:
- Paulding 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RoB—Roselms silty clay loam, 2 to 6 percent slopes

Setting

Landform: Lake plains
Position on the landform: Knolls, backslopes

Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable silty clay loam
Subsoil:
9 to 16 inches—yellowish brown and grayish brown, mottled, very firm clay
16 to 30 inches—brown, mottled, very firm clay
Substratum:
30 to 80 inches—dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 4.7 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 26 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Roselms and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 40 to 60 inches
- Soils that have less clay in the subsoil and substratum
- Soils that have an eroded surface layer of silty clay
- Moderately well drained soils

Dissimilar components:
- Paulding 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

RpA—Roselms silty clay, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Slight rises, flat areas
Size of areas: 5 to 75 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, firm silty clay
Subsoil:
8 to 34 inches—yellowish brown and brown, mottled, very firm clay
34 to 51 inches—brown, mottled, very firm clay
Substratum:
51 to 80 inches—brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High throughout the profile
Potential for frost action: High
Available water capacity: About 4.6 inches to a depth of 60 inches
Cation-exchange capacity: 20 to 32 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Roselms and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

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

- Soils that have slopes of 2 to 6 percent

Dissimilar components:

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

RpB2—Roselms silty clay, 2 to 6 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, knolls
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown, firm silty clay
Subsoil:
6 to 26 inches—yellowish brown, mottled, very firm clay
26 to 45 inches—dark yellowish brown, mottled, very firm clay
Substratum:
45 to 80 inches—dark yellowish brown, mottled, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by a very high content of clay in the subsoil and substratum
Drainage class: Somewhat poorly drained
Kind of water table: Perched
Depth to the water table: 1.0 to 2.5 feet
Permeability: Very slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 2 to 3 percent
Shrink-swell potential: High throughout the profile
Potential for frost action: High
Available water capacity: About 4.2 inches to a depth of 60 inches
Cation-exchange capacity: 20 to 32 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay in the surface layer

Composition

Roselms and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:

- Soils that have a surface layer of silty clay loam
- Soils that have carbonates in the severely eroded surface layer
- Soils that have till at a depth of 40 to 60 inches
- Moderately well drained soils

Dissimilar components:

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

Rt—Rossburg silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Size of areas: 10 to 100 acres

Typical Profile

Surface layer:
0 to 10 inches—very dark grayish brown, friable silt loam
Subsurface layer:
10 to 15 inches—very dark grayish brown, friable silt loam
Subsoil:
15 to 48 inches—brown and dark yellowish brown, friable silt loam and loam
Substratum:
48 to 80 inches—yellowish brown, very friable fine sandy loam with strata of loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Well drained
Depth to the water table: More than 6 feet
Flooding duration: Brief
Permeability: Moderate in the solum and moderately rapid or rapid in the substratum
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 4 to 8 percent
Available water capacity: About 10.5 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 32 milliequivalents per 100 grams in the surface layer

Composition

Rossburg and similar soils: 100 percent

Inclusions

Similar soils:
- Soils that have a lighter colored surface layer
- Soils that have less clay in the subsoil
- Soils that have thicker surface and subsurface layers
- Soils that have more silt and less sand in the subsoil
- Moderately well drained soils

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

Sb—Saranac silty clay loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Depressions, flat areas
Slope range: 0 to 2 percent
Size of areas: 10 to 200 acres
Special feature: This soil is in the lowest positions on the landscape.

Typical Profile

Surface layer:
0 to 11 inches—very dark gray, firm silty clay loam
Subsoil:
11 to 46 inches—dark gray, gray, and olive gray, mottled, firm silty clay
Substratum:
46 to 80 inches—grayish brown and dark grayish brown, mottled, firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Poorly drained and very poorly drained
Kind of water table: Apparent
Water table depth: At the surface to 1 foot below the surface
Flooding duration: Long
Permeability: Moderately slow
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 4 to 6 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 9.8 inches to a depth of 60 inches
Cation-exchange capacity: 15 to 30 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout

Composition

Saranac and similar soils: 90 percent
Dissimilar components: 10 percent

Inclusions

Similar soils:
- Soils that have a thinner surface layer
- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have till at a depth of 60 to 80 inches

Dissimilar components:
- Defiance soils in the higher 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

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

Sh—Shoals silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, flat areas
Slope range: 0 to 2 percent
Size of areas: 10 to 40 acres

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown, friable silt loam
Subsoil:
8 to 44 inches—dark grayish brown, brown, and yellowish brown, mottled, friable silt loam and clay loam
Substratum:
44 to 80 inches—yellowish brown, mottled, friable loam with thin strata of silt loam and sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Apparent
Depth to the water table: 0.5 foot to 1.5 feet
Flooding duration: Brief
Permeability: Moderate
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 2 to 5 percent
Potential for frost action: High
Available water capacity: About 11.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 27 milliequivalents per 100 grams in the surface layer

Composition

Shoals and similar soils: 93 percent
Dissimilar components: 7 percent

Inclusions

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

Dissimilar components:
- Saranac soils in depressions and old stream channels

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

Sk—Shoals silt loam, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Slight rises, flat areas
Slope range: 0 to 2 percent
Size of areas: 5 to 25 acres

Typical Profile

Surface layer:
0 to 8 inches—brown, friable silt loam
Subsoil:
8 to 44 inches—grayish brown and brown, mottled, friable silt loam and firm clay loam
Substratum:
44 to 80 inches—gray, mottled, friable loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Apparent
Depth to the water table: 0.5 foot to 1.5 feet
Flooding duration: Brief
Permeability: Moderate
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 2 to 5 percent
Potential for frost action: High
Available water capacity: About 11.5 inches to a depth of 60 inches
Cation-exchange capacity: 12 to 27 milliequivalents per 100 grams in the surface layer

Composition

Shoals and similar soils: 93 percent
Dissimilar components: 7 percent

Inclusions

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

Dissimilar components:
- Wabasha soils in depressions and old stream channels

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

StB2—St. Clair silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, knolls
Size of areas: 5 to 20 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 8 inches—brown, firm silty clay loam
Subsoil:
8 to 15 inches—yellowish brown, firm silty clay
15 to 25 inches—dark yellowish brown, mottled, firm silty clay
25 to 30 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
30 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 32 inches
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2 to 3 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 7.0 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

St. Clair and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have a surface layer of silt loam
- Somewhat poorly drained soils

Dissimilar components:
- Latty 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
- "Forestland" section
- "Recreation" section
- "Wildlife Habitat" section
- "Engineering" and "Soil Properties" sections

StC2—St. Clair silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 6 inches—brown, firm silty clay loam
Subsoil:
6 to 32 inches—yellowish brown, mottled, firm silty clay
Substratum:
32 to 80 inches—yellowish brown and dark yellowish brown, mottled, very firm clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 32 inches
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2 to 3 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 6.8 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

St. Clair and similar soils: 97 percent
Dissimilar components: 3 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil and substratum
- Soils that have a severely eroded surface layer of calcareous silty clay or clay
- Somewhat poorly drained soils
- Soils that have slopes of 12 to 18 percent

Dissimilar components:
- Latty 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

StD2—St. Clair silty clay loam, 12 to 18 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 7 inches—brown, firm silty clay loam
Subsoil:
7 to 21 inches—yellowish brown, very firm silty clay
21 to 24 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
24 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 32 inches
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2 to 3 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 6.8 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

St. Clair and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil and substratum
- Soils that have slopes of 18 to 25 percent
- Soils that have a severely eroded surface layer of calcareous silty clay
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

StE2—St. Clair silty clay loam, 18 to 35 percent slopes, eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Part of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 3 inches—very dark grayish brown, firm silty clay loam
Subsoil:
3 to 10 inches—brown, firm silty clay
10 to 23 inches—dark yellowish brown, very firm clay
23 to 28 inches—yellowish brown, mottled, very firm silty clay
Substratum:
28 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 32 inches
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2 to 3 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 1 to 3 percent
Shrink-swell potential: High in the subsoil and substratum
Available water capacity: About 6.6 inches to a depth of 60 inches
Cation-exchange capacity: 13 to 30 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

St. Clair and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil and substratum
- Soils that have a surface layer of silt loam
- Soils that have a severely eroded surface layer of silty clay
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SuC3—St. Clair silty clay, 6 to 12 percent slopes, severely eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Most of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 8 inches—brown, very firm silty clay
Subsoil:
8 to 12 inches—yellowish brown, very firm silty clay
12 to 18 inches—yellowish brown, mottled, very firm silty clay
18 to 25 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
25 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 32 inches
Drainage class: Moderately well drained

Kind of water table: Perched
Depth to the water table: 2 to 3 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Shrink-swell potential: High throughout the profile
Available water capacity: About 6.2 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 32 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

St. Clair and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have more clay in the subsoil and substratum
- Soils that have an eroded surface layer of silty clay loam
- Somewhat poorly drained soils

Dissimilar components:
- Latty 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

SuE3—St. Clair silty clay, 12 to 25 percent slopes, severely eroded

Setting

Landform: Lake plains
Position on the landform: Backslopes, dissected areas along streams
Size of areas: 5 to 15 acres
Special feature: Most of the original surface layer has been removed.

Typical Profile

Surface layer:
0 to 6 inches—brown, very firm silty clay
Subsoil:
6 to 9 inches—yellowish brown, very firm clay
9 to 15 inches—yellowish brown, mottled, very firm clay
15 to 21 inches—yellowish brown, mottled, very firm silty clay loam
Substratum:
21 to 80 inches—yellowish brown, mottled, very firm silty clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Restricted by unweathered till between depths of 20 and 32 inches
Drainage class: Moderately well drained
Kind of water table: Perched
Depth to the water table: 2 to 3 feet
Permeability: Slow
Dominant parent material: Till
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Shrink-swell potential: High throughout the profile
Available water capacity: About 6.2 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 32 milliequivalents per 100 grams in the surface layer
Special feature: A high content of clay throughout

Composition

St. Clair and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have an eroded surface layer of silty clay loam
- Soils that have a calcareous surface layer
- Somewhat poorly drained soils

Dissimilar components:
- Wabasha 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

TeA—Tedrow loamy sand, 0 to 3 percent slopes

Setting

Landform: Beach ridges
Position on the landform: Flat areas, slight rises
Size of areas: 5 to 15 acres

Typical Profile

Surface layer:
0 to 12 inches—very dark grayish brown, very friable loamy sand
Subsoil:
12 to 44 inches—yellowish brown and brown, mottled, very friable loamy sand and sand
Substratum:
44 to 80 inches—brown and grayish brown, mottled, loose sand

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Apparent
Depth to the water table: 1 to 2 feet
Permeability: Rapid
Dominant parent material: Beach deposits
Content of organic matter in the surface layer: 1 to 3 percent
Available water capacity: About 5.0 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 14 milliequivalents per 100 grams in the surface layer
Special feature: The surface layer may be susceptible to wind erosion.

Composition

Tedrow and similar soils: 93 percent
Dissimilar components: 7 percent

Inclusions

Similar soils:
- Soils that have more silt and clay, less sand, and a lower content of rock fragments at a depth of 60 to 80 inches
- Moderately well drained soils

Dissimilar components:
- Granby 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Tn—Toledo silty clay loam

Setting

Landform: Lake plains
Position on the landform: Drainageways, extensive flat areas
Slope range: 0 to 2 percent
Size of areas: 5 to 200 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, firm silty clay loam
Subsoil:
9 to 43 inches—gray and grayish brown, mottled, firm and very firm silty clay
Substratum:
43 to 80 inches—grayish brown, mottled, very firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Very poorly drained
Kind of water table: Apparent
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 3 to 6 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 7.2 inches to a depth of 60 inches
Cation-exchange capacity: 17 to 36 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout

Composition

Toledo and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of silty clay or clay loam
- Soils that have less clay in the surface layer and subsoil

Dissimilar components:
- Fulton 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

To—Toledo silty clay

Setting

Landform: Lake plains
Position on the landform: Drainageways, extensive flat areas
Slope range: 0 to 2 percent
Size of areas: 20 to 500 acres
Special feature: Subject to ponding

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, firm silty clay

Subsoil:
9 to 43 inches—grayish brown and gray, mottled, firm silty clay

Substratum:
43 to 74 inches—dark yellowish brown, mottled, firm silty clay
74 to 80 inches—brown, very firm clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Very poorly drained
Kind of water table: Apparent
Water table depth: 1 foot above to 1 foot below the surface
Permeability: Slow
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 3 to 6 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 6.6 inches to a depth of 60 inches
Cation-exchange capacity: 22 to 45 milliequivalents per 100 grams in the surface layer
Special feature: Hydric soil; a high content of clay throughout

Composition

Toledo and similar soils: 95 percent
Dissimilar components: 5 percent

Inclusions

Similar soils:
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a lighter colored surface layer
- Soils that have a surface layer of silty clay loam or clay loam
- Soils that have less clay in the surface layer and subsoil

Dissimilar components:
- Fulton 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

Uc—Udorthents, clayey, hilly

Setting

Landform: Lake plains, flood plains
Position on the landform: Knolls
Slope range: 12 to 25 percent
Size of areas: 20 to 60 acres

Typical Profile

0 to 80 inches—a mixture of surface, subsoil, and substratum material of silty clay or clay and, less commonly, silty clay loam and clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)

Dominant parent material: Lacustrine deposits or alluvium
General description: High knolls and ridges created during various construction activities or excavations or as reservoir embankments

Composition

Udorthents and similar soils: 80 percent
Dissimilar components: 20 percent

Inclusions

Similar soils:
- Udorthents that have less clay

Dissimilar components:
- Areas that have slopes of 0 to 12 percent
- Areas that have slopes of 25 to 50 percent
- Small, undisturbed areas of Fulton, Latty, and Paulding soils
- Occasionally flooded areas along streams and rivers

Wb—Wabasha silty clay loam, frequently flooded

Setting

Landform: Flood plains
Position on the landform: Depressions, old stream channels, flat areas
Slope range: 0 to 2 percent
Size of areas: 5 to 80 acres
Special feature: This soil is in the lowest positions on the landscape.

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown, firm silty clay loam
Subsoil:
9 to 52 inches—dark gray, gray, and grayish brown, mottled, firm silty clay
Substratum:
52 to 80 inches—yellowish brown, mottled, firm silty clay

Soil Properties and Qualities

Depth class: Very deep (more than 80 inches)
Root zone: Very deep
Drainage class: Poorly drained and very poorly drained
Kind of water table: Apparent
Water table depth: At the surface to 1 foot below the surface
Flooding duration: Brief
Permeability: Slow
Dominant parent material: Alluvium
Content of organic matter in the surface layer: 3 to 6 percent
Shrink-swell potential: High in the subsoil and substratum
Potential for frost action: High
Available water capacity: About 8.8 inches to a depth of 60 inches
Cation-exchange capacity: 20 to 36 milliequivalents per 100 grams in the surface layer
Special features: Hydric soil; a high content of clay throughout

Composition

Wabasha and similar soils: 90 percent
Dissimilar components: 10 percent

Inclusions

Similar soils:
- Soils that have a thicker surface layer
- Soils that have a lighter colored surface layer
- Soils that have more sand and less clay in the subsoil and substratum
- Soils that have till at a depth of 60 to 80 inches
- Soils that have a surface layer of silty clay

Dissimilar components:
- Defiance soils in the higher 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
- “Forestland” section
- “Recreation” section
- “Wildlife Habitat” section
- “Engineering” and “Soil Properties” sections

WhA—Whitaker loam, 0 to 2 percent slopes

Setting

Landform: Lake plains
Position on the landform: Knolls, slight rises
Size of areas: 5 to 10 acres

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown, friable loam
Subsurface layer:
9 to 13 inches—pale brown, mottled, friable loam

Subsoil:
13 to 23 inches—yellowish brown, mottled, firm clay loam
23 to 32 inches—gray, mottled, firm silty clay loam
32 to 44 inches—gray, mottled, firm clay loam
Substratum:
44 to 60 inches—light gray, very friable, stratified silt, silt loam, and sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Very deep
Drainage class: Somewhat poorly drained
Kind of water table: Apparent
Depth to the water table: 1 to 3 feet
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Dominant parent material: Lacustrine deposits
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: About 11.3 inches to a depth of 60 inches
Cation-exchange capacity: 5 to 18 milliequivalents per 100 grams in the surface layer

Composition

Whitaker and similar soils: 100 percent

Inclusions

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

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
- “Forestland” 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 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.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed 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 Cooperative Extension Service.

In 1986, more than 229,000 acres, or about 86 percent of the county, was used as cropland or pastureland (Paulding Soil and Water Conservation District, 1986). Of this total, nearly 3,800 acres, or about 1.4 percent of the county, was used as pastureland. Of the nearly 225,000 acres used as cropland, about 153,400 acres was used for row crops, mainly corn and soybeans; about 31,000 acres was used for close-growing crops, such as wheat and oats; and 6,200 acres was used for rotation hay and pasture (Carter and Hanuschak, 1986).

The soils in Paulding County vary widely in their suitability for specific crops. Different soils also require different management practices. Certain basic management practices, however, such as maintaining an adequate level of soil fertility, improving drainage, controlling erosion, and maintaining or improving soil tilth, are needed on nearly all of the soils in the county. Most of the soils in the county are suited to the crops commonly grown in the area and to some crops that are not commonly grown, such as barley, grain sorghum, popcorn, and sunflowers.

Very deep, well drained and moderately well drained, loamy soils that warm up early in the spring are well suited to many vegetables, small fruits, nursery plants, and orchards. These soils include the Belmore, Oshtemo, and Ottokee soils on beach ridges and dunes. These soils may occur in low areas where air drainage is poor and frost occurs earlier and more frequently than in other areas. Generally, these low areas are poorly suited to early small fruits and orchards.

The latest information and recommendations for

growing specialty crops are available from local offices of The Ohio State University Extension and the Natural Resources Conservation Service.

The potential for increased crop production in Paulding County is good. Crop production can be increased by applying the latest crop production technology to the existing cropland in the county. About 2,400 acres of idle land, woodland, and unimproved pasture could be used as productive cropland (Paulding Soil and Water Conservation District, 1986), but the cost of converting to cropland and the impact of these conversions on the environment should be considered. Also, the 1985 Food Security Act placed certain restrictions on bringing wetlands and highly erodible fields into production for those who participate in Federal farm programs.

Very little of the cropland and pastureland in Paulding County has been used for urban development. In 1986, an estimated 3,800 acres was used as urban land. The acreage of crops and pasture has not been significantly affected by development for urban or other uses.

Soil drainage is the major management concern in Paulding County. Wetness is a limitation on nearly 95 percent of the land. Subsurface and surface drains are used to remove excess water and allow soils to dry out and warm up earlier in the spring, thus improving plant growth (fig. 9). Short-season or early maturing crop varieties can be harvested earlier. Subsurface drains lower the seasonal high water table and thus increase the depth to which plant roots can penetrate.

Most of the soils in the county commonly have a seasonal high water table near or above the surface. Natural drainage outlets are generally not available because of the position of the soils on the landscape. If surface and subsurface drainage is not provided, these soils are usually too wet to produce most of the commonly grown crops. The poorly drained and very poorly drained Granby, Hoytville, Latty, Mermill, Millgrove, Paulding, and Toledo soils have a seasonal high water table above the surface. These soils make up about 190,000 acres, or 71 percent of the county.

The somewhat poorly drained soils have a water table in the upper part of the subsoil in winter and spring. Subsurface drainage is needed for most crops. Crop growth and yields are generally affected if the soils are not drained. Planting and harvesting are usually delayed. Bixler, Defiance, Fulton, Haskins, Nappanee, Rimer, Roselms, Shoals, Tedrow, and Whitaker soils are somewhat poorly drained. These soils make up 55,753 acres, or about 21 percent of the county.

Broughton, Flatrock, Lucas, Ottokee, and St. Clair soils are moderately well drained. The mapped areas of these soils commonly include areas of wetter soils in seeps and depressions and along drainageways, especially where slopes are 2 to 6 percent. Random surface and subsurface drains are effective in these wetter areas.

The design of both surface and subsurface drainage systems varies with the type of soil and the availability of adequate outlets. A combination of surface drainage and subsurface drainage is needed in most areas of the very poorly drained, poorly drained, and somewhat poorly drained soils that are intensively row cropped.

Drains should be more closely spaced in soils that have slow or very slow permeability than in soils that are more permeable. Subsurface drainage is slow or very slow in Broughton, Defiance, Fulton, Haskins, Hoytville, Latty, Lucas, Nappanee, Paulding, Roselms, Saranac, St. Clair, Toledo, and Wabasha soils.

Seeding ditchbanks and berms helps to prevent streambank erosion and the slumping of banks. Removing brush reduces the risk of floodwater rising above the level of outlets for subsurface drains. Animal guards prevent animals from damaging subsurface drains and blocking the flow of water. Replacing broken drains keeps silt from accumulating on the bottom of the drains and blocking drainage. Bank protection underneath the drain outlets prevents erosion. Materials used for bank protection can include rock, broken tile fragments, and grass.

Erosion is a major management concern on about 4 percent of the land in Paulding County. It is a hazard in areas where slopes are more than 2 percent.

Erosion is damaging for two main reasons—soil productivity is reduced, and the water in streams and lakes becomes polluted. Erosion of the surface layer is especially damaging on soils that have a clayey subsoil, such as Broughton, Fulton, Nappanee, Roselms, and St. Clair soils. As the surface layer is removed, part of the clayey subsoil is incorporated into the plow layer. The higher clay content in the surface layer impairs soil tilth, resulting in a poorer seedbed. More energy is needed to till the soils, and more fertilizer is needed to replace lost plant nutrients. Erosion is also damaging in areas where the soils are moderately deep over unweathered till, such as Nappanee and St. Clair soils, because it further restricts the root zone. Erosion reduces productivity on soils that tend to be droughty, such as Ottokee and Tedrow soils. Most of the available water generally is stored in the surface layer. Thus, erosion of the surface layer reduces the available water capacity of the soil.

Erosion degrades water quality by increasing the

Figure 9.—A system of surface drainage with an adequate outlet removes excess surface water from this area of Latty silty clay.

amount of sediment in streams. By volume, sediment is the largest pollutant of streams in Paulding County. Sediment indirectly degrades water quality because of the organic matter, plant nutrients, herbicides, and insecticides it carries from eroding fields. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal and recreational uses and for fish and other wildlife.

Practices that control erosion provide a protective cover of vegetation, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps plant cover on the soil for extended periods reduces the hazard of erosion. Including forage crops of legumes and grasses in the rotation also reduces the hazard of erosion and improves tilth. Also, the legumes provide nitrogen for subsequent crops.

Contour farming and terraces generally are not

practical in areas of the gently sloping to moderately steep Broughton and St. Clair soils because of the short, irregular slopes. The hazard of erosion is severe if these soils are farmed using conventional methods. Minimum tillage and no-till farming systems, which leave crop residue on the surface, increase the rate of water infiltration and help to control runoff and erosion. Belmore, Knoxdale, Landes, Lucas, Oshtemo, Ottokee, and Rossburg soils are well suited to no-till planting. The eroded Broughton, Lucas, and St. Clair soils are suited to no-till planting. If drained, areas of Bixler, Defiance, Flatrock, Fulton, Granby, Haskins, Hoytville, Latty, Medway, Mermill, Millgrove, Nappanee, Paulding, Rimer, Roselms, Saranac, Shoals, Tedrow, Toledo, and Wabasha soils are suited to no-till planting.

Grassed waterways are natural or constructed outlets protected by grass cover. Natural drainageways are the best locations for waterways because they typically require a minimum of shaping for the production of a good channel. Waterways should be wide and flat so that they can be crossed with farm machinery.

Wind erosion is a hazard on soils that have a sandy surface layer, such as Bixler, Ottokee, Rimer, and Tedrow soils. These soils are subject to damage if winds are strong and the soils are level and dry and bare of vegetation or mulch. Maintaining a plant cover, mulching, or keeping the surface ridged or rough through proper tillage minimizes the amount of soil loss caused by the wind. Maintaining field windbreaks of suitable shrubs or trees, such as eastern white pine or silky dogwood, reduces the hazard of wind erosion.

Information on the design of erosion-control practices for each kind of soil is available from the Paulding Soil and Water Conservation District.

Soil fertility is naturally low in many of the sandy soils and the more sloping soils on uplands. Sandy soils are naturally more acid than loamy or clayey soils, and they generally have a lower content of organic matter. In addition, sandy soils retain only a small amount of plant nutrients; therefore, more frequent additions of fertilizers are needed. The more acid subsoil limits the availability of some plant nutrients. Special fertilizer may be needed because of deficiencies of boron and other trace elements.

Soils on flood plains, including Flatrock, Medway, and Shoals soils, are naturally higher in plant nutrients than most of the upland soils. In most soils on flood plains, the content of organic matter is moderate or high. The Granby, Hoytville, and Millgrove soils that are in flat areas or in depressions and drainageways have a dark surface layer. The content of organic matter is moderate or high in these soils.

The effectiveness of nitrogen applied in the fall to very poorly drained, poorly drained, and somewhat poorly drained soils is reduced by leaching and denitrification. Incorporating fertilizer into the soil in gently sloping and sloping areas minimizes loss through erosion. Applications of lime may be necessary to raise the reaction of the surface layer to a level where most plant nutrients are readily available. On all of the soils, a balanced fertility program that includes additions of lime and fertilizer should be based on the results of soil tests and plant analysis. The Ohio State University Extension and private soil labs can help in determining the kinds and amounts of fertilizer to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soils. Soils that have good tilth are friable and porous. They can be worked easily, provide good seed contact, and allow quick seedling emergence and strong root growth.

Many of the soils on uplands that are used as cropland have a surface layer of silt loam or silty clay loam that has a relatively low content of organic matter. A crust generally forms on the surface of these soils when the surface dries after a heavy rainfall. The crust is hard and absorbs water slowly. It reduces the infiltration rate, retards seedling emergence, and increases the runoff rate. Regularly adding crop residue, manure, and other organic materials maintains or improves soil structure and minimizes crusting. Applying minimum tillage or mulch tillage or incorporating crop residue into the surface layer also helps to prevent crusting. Allowing part of the residue to be exposed above the surface provides pathways for the movement of air and water.

Fall moldboard plowing is generally not the best practice on soils that have a light-colored surface layer of silt loam or silty clay loam. The surface of these soils tends to form a crust in winter and spring. Many of these soils are nearly as dense and hard in the spring after fall moldboard plowing as they were before plowing. Moreover, soils that have slopes of more than 2 percent are more susceptible to erosion if they are moldboard plowed in the fall. A rough, irregular surface that leaves residue partially covered absorbs more water and dries faster than a smoothly tilled surface.

Latty and Paulding soils and some Hoytville soils have more clay in the surface layer than most of the other soils in the county. Poor tilth is a problem because these soils tend to stay wet until late in spring. These soils can be tilled only within a narrow range in moisture content. If they are tilled when wet, the soils tend to be very cloddy and hard when they

dry and the preparation of a good seedbed is difficult. Fall plowing allows winter freezing and drying to break up clods. Using mulch tillage and returning crop residue to the soil help to prevent crusting. The soils generally crack when they dry. The cracks in the soil increase the rate of water infiltration.

Soil compaction occurs if the soils are tilled or harvested when wet or if they are subject to heavy traffic or heavy loads. Compaction can be prevented by tilling the soils under the proper soil moisture conditions, using minimum tillage, and planting deep-rooted legumes and grasses. Also, using four-wheel-drive tractors with flotation tires can minimize surface compaction. Compaction limits root growth, reduces water movement, and creates plowpans.

Field crops suited to the soils and climate of the survey area include many that are not commonly grown. Corn and soybeans are the main row crops. Grain sorghum, sugar beets, sunflowers, navy beans, and similar crops can be grown. Economic conditions generally determine whether these crops are grown.

Wheat, rye, and oats are the most common close-growing crops. Alfalfa and grass-legume hay also are grown. The soils and climate are suited to barley, buckwheat, and flax and to grass seed produced from bromegrass, fescue, timothy, and bluegrass.

Specialty crops grown commercially in the survey area are mainly popcorn, sugar beets, tomatoes, and sweet corn. The acreage of such crops is limited but could be increased if economic conditions were favorable.

Belmore, Oshtemo, and Ottokee soils have good natural drainage and warm up early in spring. These soils are especially well suited to vegetables and fruits. They make up 346 acres in the county. Crops generally can be planted and harvested earlier on these soils than on most other soils in the county.

Permanent pasture makes up about 1.4 percent of the acreage in the survey area (Paulding Soil and Water Conservation District, 1986). This low percentage is partly the result of a reduction in livestock and the increased use of confined feeding. Some of the permanent pasture is in eroded strips and in irregularly shaped areas of frequently flooded soils. A few woodlots also are pastured. Woodlots generally provide grazing of poor quality, however, because forage plants are sparse. Permanent pasture near farmsteads is commonly used as feedlots or access lanes.

Most of the soils in the county are suited to the production of high-quality permanent pasture, although yields vary widely. Because of a rapid runoff rate, gently sloping to moderately steep areas of Broughton and St. Clair soils are commonly eroded, are low in fertility, and have relatively less water available for plants. Forage production on these soils is low. Growth is good in the gently sloping areas of Fulton, Haskins, and Nappanee soils, but these soils are subject to erosion if the plant cover is damaged by overgrazing. Compaction occurs if grazing livestock are allowed to trample the soils during wet periods.

Defiance, Flatrock, Medway, Shoals, and some Saranac and Wabasha soils on flood plains are potentially well suited to use as permanent pasture. The occasional or frequent flooding during the growing season in areas of these soils is less damaging to pasture than to grain crops. These alluvial soils are fertile and have a moderate or high available water capacity. Potential pasture yields are high. Surface drains and subsurface drains are needed to remove excess water on the somewhat poorly drained Defiance and Shoals soils and the very poorly drained Saranac and Wabasha soils, particularly if legumes are grown. Artificial drainage generally is not needed on the better drained Flatrock and Medway soils.

Permanent pasture has fertility requirements similar to those of cropland. Lime and fertilizer should be applied at rates determined by the results of soil tests. The control of weeds by periodic mowing and the use of recommended herbicides encourage the growth of desirable pasture plants. Controlled grazing helps to maintain pasture plants. The latest information on seeding mixtures, herbicide treatment, and other management for specific soils can be obtained from the local offices of The Ohio State University Extension and the Natural Resources Conservation Service.

Irrigation is not used to a great extent in Paulding County. Generally, rainfall is ample for crop moisture requirements but may not be timely or well distributed. During dry periods, supplemental irrigation could increase yields. Some of the soils in the county are suited to irrigation and can be irrigated if water is available. Belmore, Oshtemo, Ottokee, and Tedrow soils are especially well suited to irrigation.

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 map units in the survey area 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 also are 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 that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil 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.

The crop yield index (table 6) 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. The most productive soil 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.

Advances in planter technology, crop genetics, drainage, weed control, pest management, soil fertility, and soil management can make a standard yield table obsolete within several years. The yield index in table 6 should provide users with good information on the relative productivity of soils in the county for years to come.

Soils that have slopes of more than 12 percent were not ranked for crop production. These soils were ranked on the basis of estimated pasture and hayland yields.

Some map units are not used for any type of crop production and thus are not rated in the table.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed map units in the county for crops are shown in table 7. The main concerns in managing nonirrigated cropland are controlling water 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.

Surface and/or subsurface drainage is used to lower a ***seasonal high water table*** and to control ***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.

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 the 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 content of organic matter 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.

Very high clay content in the subsoil and substratum.—A very high content of clay in the subsoil and substratum restricts rooting depth.

High clay content in the subsoil and substratum.—A high content of clay in the subsoil and substratum restricts rooting depth.

Surface crusting.—Hardening of the bare soil surface can hinder or prevent seedling emergence. Minimizing tillage slows the destruction of soil structure and helps to prevent 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.

Rare flooding.—The component of the map unit is subject to rare flooding.

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.

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 below a layer that has a bulk density of 1.7 or less.

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.

Very high clay content in the subsoil and substratum.—The component of the map unit has more than 60 percent clay in the subsoil and the substratum.

High clay content in the subsoil and substratum.—The component of the map unit has 40 to 60 percent clay in the subsoil and the substratum.

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 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 a 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 woodland or 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 the numbers 1 through 8. The numbers 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 a 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, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 8. The capability classification of map units in this survey area is given in table 5 and under the heading "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 section “Interpretive Groups.” 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 deep or very deep and are well drained or moderately well drained. They have a surface layer of sandy loam, silt loam, loam, or silty clay loam. The 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 deep or very deep and are well drained or moderately well drained. They have a surface layer of silt loam. 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. The low pH of the subsoil can shorten the life of some deep-rooted legumes in the stand. 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 or overgrazed or cultivated for reseeding. These soils are suited to no-till reseedings and interseedings.

Soils in group A-3 are deep or very deep and are well drained or moderately well drained. They have a surface layer of silt loam. Slopes range from 25 to 50 percent. These soils generally are not suited to pasture or hay because of the slope.

Soils in group A-5 are deep or very deep and are well drained or moderately well drained. They are subject to brief or very brief 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 ranges from low to very high. Slopes range from 0 to 2 percent.

Soils in group A-6 are deep or very deep, are well drained or moderately well drained, and are subject to frost action. Frost action can damage legume stands. Mixing fibrous-rooted grasses with legumes and using proper grazing management methods help to prevent the damage caused by frost action. The soils have a surface layer of silt loam or silty clay loam. Available water capacity ranges from low to very high. Slopes range from 0 to 18 percent.

Soils in group B have limited growth and production potential because of droughtiness.

Soils in group B-1 are deep or very deep and are well drained to very poorly drained. They have a surface layer ranging from loamy sand to silty clay loam. Available water capacity is low or very low. These soils are sandy or skeletal in the subsoil. Slopes range from 0 to 25 percent.

Soils in group C are wet because of a seasonal high water table.

Soils in group C-1 are deep or very deep and are somewhat poorly drained or very poorly drained. They have a surface layer of loamy sand, silt loam, loam, silty clay loam, or silty clay. Available water capacity ranges from low to very high. These soils normally respond well to subsurface drainage. Slopes range from 0 to 6 percent.

Soils in group C-2 are moderately deep to very deep and are somewhat poorly drained or very poorly drained. They have a surface layer of silt loam, loam, silty clay loam, clay loam, or silty clay. Available water capacity ranges from low to very high. A 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 subsurface drainage is typically restricted by the 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 4 percent.

Soils in group C-3 are very deep and are very poorly drained, poorly drained, or somewhat poorly drained. They are subject to 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 silty clay loam. Available water capacity ranges from moderate to very 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 subsurface drainage is restricted by the landscape position of the soils.

Soils in group D are organic soils.

Soils in group D-1 are very deep and are very poorly drained. They formed entirely or partially in organic material. Available water capacity ranges from moderate to very high. Slopes range from 0 to 2 percent.

Soils in group F have only 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 silt loam. Available water capacity is low. 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.

Soils in group F-2 are moderately deep and are well drained or moderately well drained. They have a surface layer of silt loam. Available water capacity is low or moderate. Slopes range from 20 to 50 percent. These soils generally are not suited to pasture or hay because of the slope.

Soils in group F-5 are very deep and are moderately well drained. They have a surface layer of silty clay loam or silty clay. Available water capacity is low or moderate. A high content of clay in the subsoil restricts the rooting depth of deep-rooted forage plants. Shallow-rooted species grow best in areas of these soils. The soils are better suited to forage species that do not have a taproot. Slopes range from 2 to 25 percent.

Soils in group F-6 are very deep and are moderately well drained. They have a surface layer of silty clay loam. Available water capacity is low or moderate. A high content of clay in the subsoil restricts the rooting depth of deep-rooted forage plants. Shallow-rooted species grow best in areas of these soils. The soils are better suited to forage species that do not have a taproot. Slopes range from 18 to 35 percent.

Soils in group F-7 are very deep and are somewhat poorly drained or very poorly drained. They have a surface layer of loam, silty clay loam, silty clay, or clay. Available water capacity is low or moderate. A high content of clay in the subsoil restricts the rooting depth of deep-rooted 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 subsurface drainage is generally limited by the permeability of the subsoil and the landscape position of the soils. These soils are better suited to forage species that do not have a taproot. Slopes range from 0 to 6 percent.

Soils in group H-1 are not suited to pasture or hay because they are toxic or 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 in the county.

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 169,000 acres in the survey area, or nearly 63 percent of the total acreage, meets the soil

requirements for prime farmland. Scattered areas of this land are throughout the county, mainly in associations 2, 3, and 4, which are described under the heading “General Soil Map Units.” Almost all of this prime farmland is used for crops. The crops grown on this land, mainly corn, soybeans, and wheat, account for an estimated 70 percent of the county’s total agricultural income each year.

A recent trend in land use in a few areas of the county 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.”

More than 3,200 acres of prime farmland in the county consists of well drained and moderately well drained soils on ridgetops and benches in the uplands. Nearly 16,000 acres consists of poorly drained, somewhat poorly drained, moderately well drained, and well drained soils on terraces and flood plains and on footslopes, toeslopes, and fans at the base of hillsides.

Forestland

Michael Jurkiewicz, service forester, Ohio Department of Natural Resources, Division of Forestry, helped prepare this section.

Nearly all of Paulding County was forested at the time of the earliest land surveys. The entire county is in the Great Black Swamp of northwestern Ohio, and the area once supported heavy timber. The climax forest communities were dominantly elm and ash swamp forest in the broad flat areas away from rivers and streams. Areas adjacent to rivers and streams are typically better drained and supported such species as oak, hickory, eastern cottonwood, maple, and American basswood.

In 1986, about 16,800 acres, or 6.3 percent of the county, was wooded (Paulding Soil and Water Conservation District, 1986). Most of this acreage is in small scattered woodlots on slopes along stream valleys, on flood plains, and in undrained areas on uplands. Stands are dominantly mixed American elm, black ash, white ash, silver maple, red maple, swamp white oak, pin oak, cottonwood, and American sycamore. Most of the woodland has been cut over, and much of it has been grazed.

The potential for increased production of timber is high. If managed well, woodlots are capable of producing high-quality, rapidly growing native hardwoods. In addition, many woodlots could provide firewood, edible nuts, wildlife habitat, esthetic value, and protection from strong winds.

About 8,200 acres, or about 50 percent, of the woodland in the county is in need of some type of conservation treatment (Paulding Soil and Water Conservation District, 1986). Livestock grazing in the woodland and inadequately stocked timber stands are the major problems. Timber stand improvement practices, such as culling diseased and less desirable trees and cutting and spraying vines, improve the growth rate of favored species. Harvesting mature trees benefits desirable trees by reducing competition and the potential for disease. When species are selected for planting on open ground, the slope and the type of soil should be considered. Planting in established stands is seldom needed or advised. Fencing livestock out of the woods and providing fire protection help to maintain good stands.

Information on forest management is available from the Ohio Department of Natural Resources, Division of Forestry; The Ohio State University Extension; and the Natural Resources Conservation Service.

Table 10 can be used by forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed.

The table lists the woodland ordination symbol for each soil. The ordination system is a nationwide uniform system of labeling soils or groups of soils that are similar in use and management. The primary factors evaluated in the woodland ordination system are productivity of the forest overstory tree species and the principal soil properties resulting in hazards and limitations that affect forest management. There are three parts of the ordination system—class, subclass, and group. The class and subclass are referred to as the ordination symbol. The ordination symbol listed in the table is for south aspects. The ordination symbol of the soils in the survey area is also given in the section “Interpretive Groups.”

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; ***L***, low strength; 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, L, 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.

Suggested trees to plant are those that are suitable for commercial wood production.

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.

Table 11 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the 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 or of the Cooperative Extension Service or from a commercial nursery.

Recreation

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 also are important. Soils 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

J.M. Daugherty, private lands biologist, Wildlife District Two, Findlay, Ohio, Ohio Department of Natural Resources, Division of Wildlife, helped prepare this section.

Wildlife habitat is directly related to soils and to land use. The quality, type, and abundance of habitat limit the species and populations in an area. Many species of wildlife inhabit the survey area, and most have varied in numbers over the years because of changes in land use. Cottontail rabbits, bobwhite quail, ring-necked pheasants, eastern meadowlarks, and bobolinks were once among the most abundant upland wildlife species. Populations of these species have declined recently, however, because of changes in land use, mainly farming practices. The conversion of pasture and hayland to the production of row crops, the removal of fencerows, and intensified cropping systems have all contributed to the loss of upland wildlife habitat. White-tailed deer populations have increased in recent years, partly because of the availability of old pastures and woodlots that are no longer being grazed by livestock. Furbearers, such as red fox, gray fox, raccoon, skunks, opossum, and muskrat, are also relatively abundant. Many species of resident and migratory birds nest in the county.

Most areas along the Maumee and Auglaize Rivers and their tributaries provide excellent habitat for all types of wildlife species that are common in the county. These areas also provide habitat and staging areas during periods of waterfowl migration. If proper management is applied, all of the soils in Paulding County can be used to provide habitat for wildlife. In places, incorporating habitat elements for openland, wetland, and woodland wildlife into a single area can attract the widest variety of wildlife species.

Habitat for wetland wildlife can be further developed in undrained depressions and in old stream channels on flood plains. Ponds and marshes provide habitat for songbirds, waterfowl, shore birds, and wetland furbearers. Special plantings help to attract waterfowl. Water level management can further enhance the value to wildlife in some of these areas.

Most of the upland soils in the county are well suited to plants that are valuable as wildlife food and cover. Grassland nesting areas are especially critical. Planting grasses and legumes helps to create these areas. Additional nesting cover can be provided by delaying the mowing of odd areas, such as ditch berms, roadsides, field edges, and pastures, until after August 1 of each year. Also, fruit-bearing shrubs can be planted in hedgerows and along field borders to provide winter cover and food. Managing for food-producing trees and leaving hollow den trees improve woodlots as wildlife habitat. Cropland also can be valuable as wildlife habitat if managed properly. Eroded soils can be developed into habitat for upland wildlife by planting grasses and legumes and shrubs. These plantings provide food and cover for wildlife and also help to control erosion.

Field windbreaks and shelterbelts around farm buildings can provide food and cover for wildlife if suitable species are planted and maintained. Creating special habitat through the use of artificial nesting structures and feeding stations and planting patches of grain or wildflowers can attract wildlife.

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 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 also are considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

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 also are 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 also are considerations. Examples of wild herbaceous plants are pigweed, goldenrod, lamb's-quarters, Queen Anne's lace, and yarrow.

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, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated ***good*** are Russian-olive, autumn-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, 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.

Additional information regarding the development of wildlife habitat is available from the Ohio Department of Natural Resources, Wildlife District Two; from the State game protector; or from the local office of the Natural Resources Conservation Service.

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; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). 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 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 that can be 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 and others, 1998).

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.

This survey can be used to locate probable areas of hydric soils.

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 and others, 1998).

Gr Granby loamy sand, clayey substratum
Hs Hoytville silty clay loam
Ht Hoytville silty clay
Lb Latty silty clay loam
Lc Latty silty clay
Me Mermill loam
Mg Millgrove loam, till substratum
Pc Paulding clay
Sb Saranac silty clay loam, occasionally flooded
Tn Toledo silty clay loam
To Toledo silty clay
Wb Wabasha silty clay loam, frequently flooded

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.

BeB Belmore loam, till substratum, 2 to 6 percent slopes
BkA Bixler loamy sand, clayey substratum, 0 to 2 percent slopes
BrB2 Broughton silty clay loam, 2 to 6 percent slopes, eroded
BrC2 Broughton silty clay loam, 6 to 12 percent slopes, eroded
BrD2 Broughton silty clay loam, 12 to 18 percent slopes, eroded
BrE2 Broughton silty clay loam, 18 to 35 percent slopes, eroded
BsC3 Broughton silty clay, 6 to 12 percent slopes, severely eroded
BsD3 Broughton silty clay, 12 to 18 percent slopes, severely eroded
Db Defiance silty clay loam, occasionally flooded
Dc Defiance silty clay loam, frequently flooded
Fc Flatrock silt loam, frequently flooded
FtA Fulton loam, 0 to 2 percent slopes
FuA Fulton silty clay loam, 0 to 2 percent slopes
FuB2 Fulton silty clay loam, 2 to 6 percent slopes, eroded
FxA Fulton silty clay loam, loamy substratum, 0 to 2 percent slopes

FxB Fulton silty clay loam, loamy substratum, 2 to 6 percent slopes
HaA Haskins loamy sand, 0 to 2 percent slopes
HkA Haskins loam, 0 to 2 percent slopes
HkB Haskins loam, 2 to 6 percent slopes
LtA Lucas silt loam, loamy substratum, 0 to 2 percent slopes
LuB2 Lucas silty clay loam, loamy substratum, 2 to 6 percent slopes, eroded
LuC2 Lucas silty clay loam, loamy substratum, 6 to 12 percent slopes, eroded
NnA Nappanee loam, 0 to 2 percent slopes
NpA Nappanee silty clay loam, 0 to 2 percent slopes
NpB Nappanee silty clay loam, 2 to 6 percent slopes
NpB2 Nappanee silty clay loam, 2 to 6 percent slopes, eroded
OsB Oshtemo sandy loam, till substratum, 2 to 6 percent slopes
OtB Ottokee loamy sand, 0 to 6 percent slopes
RkA Rimer loamy sand, 0 to 2 percent slopes
RkB Rimer loamy sand, 2 to 6 percent slopes
RmA Rimer-Fulton complex, 0 to 2 percent slopes
RnA Roselms loam, 0 to 2 percent slopes
RoA Roselms silty clay loam, 0 to 2 percent slopes
RoB Roselms silty clay loam, 2 to 6 percent slopes
RpA Roselms silty clay, 0 to 2 percent slopes
RpB2 Roselms silty clay, 2 to 6 percent slopes, eroded
Sh Shoals silt loam, occasionally flooded
Sk Shoals silt loam, frequently flooded
StB2 St. Clair silty clay loam, 2 to 6 percent slopes, eroded
StC2 St. Clair silty clay loam, 6 to 12 percent slopes, eroded
StD2 St. Clair silty clay loam, 12 to 18 percent slopes, eroded
StE2 St. Clair silty clay loam, 18 to 35 percent slopes, eroded
SuC3 St. Clair silty clay, 6 to 12 percent slopes, severely eroded
SuE3 St. Clair silty clay, 12 to 25 percent slopes, severely eroded
TeA Tedrow loamy sand, 0 to 3 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 data in the tables described under the heading “Soil Properties.”

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.

The table 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 the table 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, rock 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 this 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 the 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. 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, 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. 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. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

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 shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

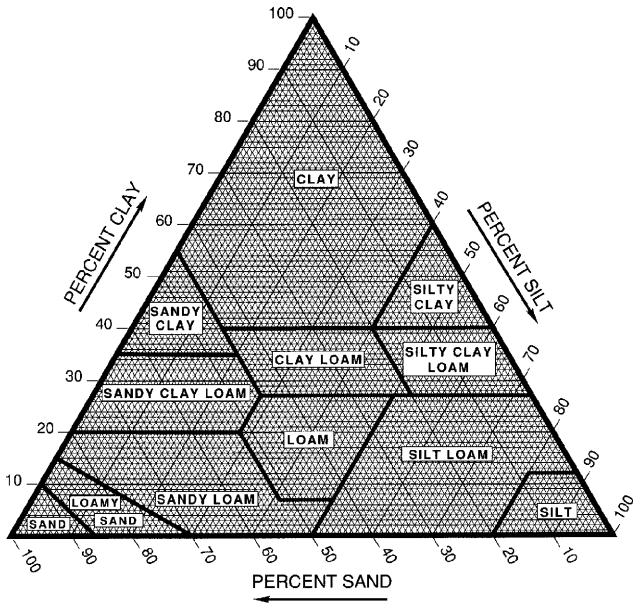

Figure 10.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 18 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

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. 10). “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 grain-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 grain-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 19 and 20 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. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major 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 greatly affect the fertility and physical condition of the soil. They determine 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.

In table 19, ***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 $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major 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. A bulk density of more than 1.6 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 major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the 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. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, 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 (fig. 11). 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***, 6 to 9 percent; and ***very high***, greater than 9 percent.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, 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 affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

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 Universal Soil Loss Equation (USLE) 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 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 resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. 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 rock fragments on the surface or because of surface wetness.

The ***wind erodibility index*** is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

In table 20, ***cation-exchange capacity*** is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents 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 helps to prevent the pollution of ground water.

Figure 11.—Paulding clay is subject to shrinking and swelling, which can cause cracks several feet deep during dry periods.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major 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.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. 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.

Water Features

Table 21 gives estimates of several important 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 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.

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is 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.

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. ***None*** means that flooding is not probable; ***rare*** that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); ***occasional*** that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and ***frequent*** that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as ***very brief*** if less than 2 days, ***brief*** if 2 to 7 days, ***long*** if 7 days to 1 month, and ***very long*** if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

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.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

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. An ***artesian*** water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. “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.

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 the ***maximum ponding depth*** and the ***duration*** of the ponding. Maximum ponding depth refers to the depth of the water above the surface of the soil. 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.

Soil Features

Table 22 gives estimates of several important soil features. The estimates are used in land use planning that involves engineering considerations.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The

rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential 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.

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 in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel 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.

Physical and Chemical Analyses of Selected Soils

Many of the soils in Paulding County were sampled by the Soil Characterization Laboratory, School of Natural Resources, The Ohio State University, Columbus, Ohio. The physical and chemical data obtained on most samples included particle-size distribution, reaction, organic matter content, calcium carbonate equivalent, and extractable cations.

These data were used in the classification and correlation of the soils and in evaluating their behavior under various land uses. Among the samples evaluated, two pedons were selected as representative of their respective series. They are described in the section “Soil Series and Their Morphology.” These series and their laboratory identification numbers are Latty, PD-S33, and Paulding, PD-S8.

In addition to the data from Paulding County, laboratory data are available from nearby counties in northwestern Ohio that include many of the same soils. These data and the data from Paulding County are on file at the School of Natural Resources, The Ohio State University, Columbus, Ohio; the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio; and the Natural Resources Conservation Service, State Office, Columbus, Ohio. Some of these data have been published in special studies of soils in Paulding County and nearby counties.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1992 and 1999). 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. Twelve 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, 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 survey area 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. 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, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1992). 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.

Belmore Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the solum, rapid in the loamy and gravelly substratum, and slow in the till
Parent material: Beach deposits overlying till
Landform: Lake plains, beach ridges on lake plains

Position on the landform: Knolls, backslopes
Slope range: 2 to 6 percent
Adjacent soils: Millgrove

Taxonomic classification: Fine-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Belmore loam, till substratum, 2 to 6 percent slopes, about 5 miles southwest of Payne, in Benton Township, about 2,280 feet west and 1,760 feet north of the southeast corner of sec. 31, T. 1 N., R. 1 E.

Ap—0 to 6 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; common fine and medium roots; 5 percent rock fragments; moderately acid; clear wavy boundary.

Bt1—6 to 18 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; common fine and few medium roots; few faint brown (10YR 4/3) clay films on faces of peds; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bt2—18 to 29 inches; dark brown (7.5YR 3/4) clay loam; weak medium and coarse subangular blocky structure; friable; common fine roots; common faint dark brown (10YR 3/3) clay films on faces of peds and clay bridging between sand grains; 8 percent rock fragments; moderately acid; clear wavy boundary.

Bt3—29 to 39 inches; dark brown (10YR 3/3) clay loam; weak medium and coarse subangular blocky structure; firm; common fine roots; many faint dark brown (10YR 3/3) clay films on faces of peds and clay bridging between sand grains; 10 percent rock fragments; neutral; abrupt smooth boundary.

2C1—39 to 46 inches; brown (10YR 5/3) gravelly coarse sandy loam; massive; firm because of weak cementation by calcium carbonates; 20 percent rock fragments; strongly effervescent; slightly alkaline; clear smooth boundary.

2C2—46 to 75 inches; brown (10YR 5/3) sandy loam; massive; very friable; thin strata of loamy sand; 10 percent rock fragments; strongly effervescent; slightly alkaline; clear wavy boundary.

3C3—75 to 80 inches; brown (10YR 5/3) clay loam; massive; very firm; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 22 to 55 inches
Depth to carbonates: 22 to 55 inches
Depth to till substratum: 60 to 80 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 7.5YR or 10YR, value of 3 to 5, chroma of 3 or 4
Texture—loam, clay loam, or sandy clay loam
Content of rock fragments—2 to 15 percent

2C or 2Cg horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 4
Texture—sandy loam, coarse sandy loam, or the gravelly analogs of these textures; common thin strata of loamy sand or sand
Content of rock fragments—10 to 30 percent

3C horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 to 4
Texture—clay loam, silty clay loam, or silty clay
Content of rock fragments—2 to 10 percent

Bixler Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid in the sandy material, moderate in the underlying loamy and silty subsoil and substratum, and slow or very slow in the clayey substratum
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Slight rises, knolls
Slope range: 0 to 2 percent
Adjacent soils: Fulton, Granby, Mermill, Toledo

Taxonomic classification: Loamy, mixed, mesic Aquic Arenic Hapludalfs

Typical Pedon

Bixler loamy sand, clayey substratum, 0 to 2 percent slopes, about 2 miles south of Arthur, in Auglaize Township, about 1,720 feet west and 340 feet north of the southeast corner of sec. 35, T. 3 N., R. 4 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; very friable; common coarse and medium roots and many fine roots; strongly acid; abrupt smooth boundary.

E1—10 to 20 inches; yellowish brown (10YR 5/4)

loamy sand; weak medium and coarse subangular blocky structure; very friable; common medium and fine roots; few distinct very dark grayish brown (10YR 3/2) wormcasts and organic coatings in root channels; few medium faint pale brown (10YR 6/3) iron depletions in the matrix; common coarse faint yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common coarse distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; moderately acid; clear wavy boundary.

E2—20 to 28 inches; yellowish brown (10YR 5/6) loamy sand; weak medium and coarse subangular blocky structure; very friable; few fine roots; few prominent dark grayish brown (10YR 4/2) organic coatings in root channels; many fine and medium prominent grayish brown (10YR 5/2) iron depletions in the matrix; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; moderately acid; clear smooth boundary.

Btg1—28 to 36 inches; grayish brown (10YR 5/2) sandy loam; weak medium and coarse subangular blocky structure; friable; few fine roots; many faint gray (10YR 5/1) clay films on faces of peds and in root channels; few fine distinct black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; common fine prominent yellowish brown (10YR 5/6) and few coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; moderately acid; abrupt wavy boundary.

2Btg2—36 to 46 inches; grayish brown (2.5Y 5/2) silt loam; moderate medium and coarse subangular blocky structure; firm; thin strata of silty clay loam; few fine roots; many distinct gray (10YR 5/1) clay films on faces of peds; many fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) iron and manganese concretions in the matrix; neutral; clear wavy boundary.

2C1—46 to 74 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; thin strata of very fine sandy loam; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; few coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; strongly effervescent; slightly alkaline; abrupt wavy boundary.

3C2—74 to 80 inches; dark yellowish brown (10YR 4/4) silty clay; massive; firm; light gray (10YR 7/2) masses of calcium carbonate accumulation on vertical faces of partings; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the A and E horizons: 20 to 35 inches
Thickness of the solum: 28 to 55 inches
Depth to carbonates: 28 to 55 inches
Depth to clayey substratum: 60 to 80 inches

Ap horizon:
Color—hue of 10YR, value of 2 to 4, chroma of 1 to 3
Texture—loamy 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 sand or 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—sandy loam, fine sandy loam, or loam

2Bt or 2Btg horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, chroma of 2 to 6
Texture—silt loam with thin strata of silty clay loam

2C or 2Cg horizon:
Color—hue of 7.5YR to 2.5Y or N, value of 4 to 6, chroma of 0 to 6
Texture—silt loam that is commonly stratified with silty clay loam, silt, fine sand, or very fine sandy loam

3C or 3Cg horizon:
Color—hue of 7.5YR to 2.5Y or N, value of 4 to 6, chroma of 0 to 6
Texture—silty clay, clay, or silty clay loam

Broughton Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Very slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Knolls, backslopes, dissected areas along streams
Slope range: 2 to 35 percent
Adjacent soils: Paulding, Roselms

Taxonomic classification: Very fine, illitic, mesic Aquic Hapludalfs

Typical Pedon

Broughton silty clay, 6 to 12 percent slopes, severely eroded, about 1.5 miles east of Oakwood, in Brown Township, about 800 feet west and 160 feet south of the northeast corner of sec. 36, T. 2 N., R. 4 E.

Ap—0 to 5 inches; brown (10YR 5/3) silty clay, very pale brown (10YR 7/3) dry; weak medium subangular blocky structure; very firm; few medium and common fine roots; neutral; clear smooth boundary.

Bt1—5 to 12 inches; yellowish brown (10YR 5/4) clay; moderate medium and coarse subangular blocky structure; very firm; few fine roots; common faint yellowish brown (10YR 5/4) clay films on faces of peds; many medium faint brown (10YR 5/3) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; neutral; clear wavy boundary.

Bt2—12 to 16 inches; brown (10YR 5/3) clay; strong medium and coarse subangular blocky structure; very firm; few fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; common faint brown (10YR 5/3) pressure faces on vertical faces of peds; common medium prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as coatings on vertical faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct gray (10YR 6/1) iron depletions in the matrix; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; strongly effervescent; slightly alkaline; clear wavy boundary.

Bt3—16 to 27 inches; yellowish brown (10YR 5/4) clay; weak coarse prismatic structure; very firm; few fine roots on vertical faces of peds; many distinct grayish brown (10YR 5/2) and faint brown (10YR 5/3) clay films on faces of peds; common faint yellowish brown (10YR 5/4) pressure faces on vertical faces of peds; common medium prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as coatings on vertical faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; strongly effervescent; slightly alkaline; gradual smooth boundary.

BC—27 to 34 inches; dark yellowish brown (10YR 4/4) clay; weak coarse prismatic structure; very firm; few fine roots on vertical faces of peds; common distinct gray (10YR 6/1) pressure faces on vertical faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; common fine light gray (10YR 7/1) masses of calcium sulfate accumulation occurring as crystals on faces of peds; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—34 to 44 inches; dark yellowish brown (10YR 4/4) clay; massive; very firm; many distinct gray (10YR 6/1) pressure faces on vertical faces of partings; common fine light gray (10YR 7/1) masses of calcium sulfate accumulation occurring as crystals on faces of partings; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—44 to 80 inches; dark yellowish brown (10YR 4/4) clay; massive; laminated; very firm; brown (10YR 5/3) pressure faces that decrease in number with increasing depth on vertical faces of partings; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 14 to 36 inches
Depth to carbonates: 11 to 32 inches

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—silty clay or silty clay loam

Bt or Btg horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 to 6
Texture—clay

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4
Texture—clay

Defiance Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Flat areas, slight rises
Slope range: 0 to 2 percent
Adjacent soils: Flatrock, Saranac, Wabasha

Taxonomic classification: Fine, illitic, nonacid, mesic Aeric Fluvaquents

Typical Pedon

Defiance silty clay loam, occasionally flooded, about 4.3 miles east-southeast of Cecil, in Emerald Township, about 1,240 feet west and 200 feet north of the southeast corner of sec. 16, T. 3 N., R. 3 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure parting to weak fine and medium granular; firm; common medium and many fine roots; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

Bw—8 to 13 inches; brown (10YR 5/3) silty clay loam; weak medium and fine subangular blocky structure; firm; common fine roots; common faint dark grayish brown (10YR 4/2) organic coatings on faces of peds; common fine distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; 2 percent rock fragments; moderately acid; clear wavy boundary.

Bg1—13 to 20 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; few faint dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; common fine faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 2 percent rock fragments; moderately acid; clear wavy boundary.

Bg2—20 to 36 inches; grayish brown (10YR 5/2) silty clay; moderate medium subangular blocky structure; firm; few fine roots; few faint grayish brown (10YR 5/2) coatings on vertical faces of peds; common fine and medium faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 3 percent rock fragments; slightly acid; gradual wavy boundary.

B´w—36 to 48 inches; yellowish brown (10YR 5/4) clay; weak coarse and medium subangular blocky structure; firm; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine and medium distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; 3 percent rock fragments; neutral; gradual wavy boundary.

Cg—48 to 80 inches; grayish brown (10YR 5/2) clay; massive; firm; thin strata of clay loam; common medium and coarse prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium and coarse faint gray (10YR 5/1) iron depletions in the matrix; 2 percent rock fragments; neutral.

Range in Characteristics

Thickness of the solum: 24 to 50 inches

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 2
Texture—silty clay loam
Content of rock fragments—0 to 10 percent

Bw horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 3 to 6
Texture—silty clay, silty clay loam, clay, or clay loam
Content of rock fragments—0 to 15 percent

Bg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—silty clay, silty clay loam, clay, or clay loam
Content of rock fragments—0 to 15 percent

Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2

Texture—silty clay or clay; thin strata of silty clay loam, clay loam, silt loam, loam, or sandy loam in most pedons
Content of rock fragments—0 to 15 percent

Flatrock Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Adjacent soils: Defiance, Knoxdale, Saranac, Shoals, Wabasha

Taxonomic classification: Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts

Typical Pedon

Flatrock silt loam, frequently flooded, about 1.7 miles southwest of Paulding, in Paulding Township, about 1,450 feet east and 1,450 feet north of the southwest corner of sec. 14, T. 2 N., R. 2 E.

Ap—0 to 13 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; few fine roots; common faint dark grayish brown (10YR 4/2) organic coatings on faces of peds and in worm channels; neutral; clear smooth boundary.
Bw1—13 to 18 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; many faint dark brown (10YR 4/3) wormcasts; few faint brown (10YR 5/3) coatings on vertical faces of peds; few fine faint dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; few fine distinct prominent very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; slightly acid; gradual wavy boundary.
Bw2—18 to 30 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; firm; few fine roots; common faint distinct brown (10YR 5/3) and common distinct light brownish gray (10YR 6/2) coatings on vertical faces of peds; few fine distinct prominent black (10YR 2/1) masses of iron and manganese accumulation in the matrix; few fine distinct grayish brown (10YR 5/2) and common fine faint distinct brown (10YR 5/3) iron depletions in the matrix; neutral; gradual wavy boundary.
Bw3—30 to 44 inches; dark yellowish brown (10YR 4/4) loam; weak and moderate medium subangular blocky structure; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) coatings on vertical faces of peds; many medium distinct prominent black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; common medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; few medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; neutral; gradual wavy boundary.
C—44 to 80 inches; yellowish brown (10YR 5/4) loam; massive; friable; thin strata of silt loam and fine sandy loam; common medium prominent black (10YR 2/1) masses of iron and manganese accumulation in the matrix and on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct faint yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; neutral.

Range in Characteristics

Thickness of the solum: 24 to 50 inches

Ap horizon:
Color—hue of 10YR, value of 4, chroma of 2 or 3
Texture—silt loam

Bw horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silt loam or loam

C or Cg horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4
Texture—loam, silt loam, sandy loam, or fine sandy loam; commonly stratified

Fulton Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum (slow in the subsoil and moderate in the substratum in the loamy substratum phase)
Parent material: Lacustrine deposits (lacustrine deposits overlying loamy glaciofluvial deposits in the loamy substratum phase)

Landform: Lake plains, stream terraces
Position on the landform: Slight rises, flat areas, knolls, backslopes
Slope range: 0 to 6 percent
Adjacent soils: Haskins, Latty, Lucas, Rimer, Toledo

Taxonomic classification: Fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Fulton silty clay loam, 0 to 2 percent slopes, about 2.1 miles north of Oakwood, in Brown Township, about 1,600 feet west and 600 feet north of the southeast corner of sec. 14, T. 2 N., R. 4 E.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak coarse subangular blocky structure parting to moderate fine and medium granular; firm; few fine and medium roots; 10 percent mixing of yellowish brown (10YR 5/4) material from the Bt1 horizon; moderately acid; clear smooth boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; firm; few fine and medium roots; many distinct grayish brown (10YR 5/2) clay films (iron depletions) on faces of peds; many medium and coarse distinct yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; many medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; strongly acid; gradual smooth boundary.

Bt2—18 to 24 inches; brown (10YR 5/3) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many faint grayish brown (10YR 5/2) clay films (iron depletions) on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct prominent black (10YR 2/1) iron and manganese oxide concretions in the matrix; moderately acid; gradual smooth boundary.

Bt3—24 to 31 inches; brown (10YR 5/3) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common faint grayish brown (10YR 5/2) clay films (iron depletions) on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; many medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct prominent black (10YR 2/1) iron and manganese oxide concretions in the matrix; neutral; gradual wavy boundary.

Bt4—31 to 38 inches; yellowish brown (10YR 5/4) silty clay; weak medium and coarse subangular blocky structure; very firm; common distinct gray (10YR 5/1) clay films (iron depletions) on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct faint yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine distinct prominent black (10YR 2/1) iron and manganese oxide concretions in the matrix; neutral; gradual wavy boundary.

BC—38 to 47 inches; yellowish brown (10YR 5/4) silty clay; weak medium and coarse subangular blocky structure; very firm; common distinct gray (10YR 5/1) coatings (iron depletions) on vertical faces of peds; few fine distinct faint yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct prominent white (10YR 7/2) calcium carbonate nodules in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—47 to 80 inches; yellowish brown (10YR 5/4) silty clay; massive; weakly laminated; very firm; common distinct gray (10YR 5/1) coatings (iron depletions) on faces of vertical partings; few fine distinct faint yellowish brown (10YR 5/6) masses of iron accumulations in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct prominent white (10YR 7/2) calcium carbonate nodules in the matrix; few medium distinct prominent white (10YR 8/1) calcium carbonate crystals in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 60 inches
Depth to carbonates: 22 to 40 inches
Depth to loamy substratum: More than 80 inches (40 to 80 inches in the loamy substratum phase)

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 3
Texture—silty clay loam or 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 or 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, or silty clay loam with thin

strata of silt loam, loam, or fine sandy loam in some pedons (loam, silt loam, fine sandy loam, or clay loam that is commonly stratified in the loamy substratum phase)

Granby Series

Depth class: Very deep
Drainage class: Poorly drained and very poorly drained
Permeability: Rapid in the sandy solum and substratum and slow or very slow in the underlying clayey substratum
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Flat areas, depressions
Slope range: 0 to 2 percent
Adjacent soils: Bixler, Ottokee, Tedrow

Taxonomic classification: Sandy, mixed, mesic Typic Endoaquolls

Typical Pedon

Granby loamy sand, clayey substratum, about 2.25 miles northwest of Junction, in Emerald Township, about 1,060 feet east and 2,480 feet north of the southwest corner of sec. 14, T. 3 N., R. 3 E.

Ap—0 to 10 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; very friable; many fine, common medium, and few coarse roots; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; strongly acid; abrupt smooth boundary.

A—10 to 13 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; very friable; common fine and few medium roots; few faint very dark brown (10YR 2/2) coatings on faces of peds; few medium distinct brown (10YR 5/3) masses of iron accumulation in the matrix; moderately acid; clear smooth boundary.

Bg1—13 to 20 inches; dark gray (10YR 4/1) sand; weak medium and fine subangular blocky structure; very friable; few medium and common fine roots; few faint very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; common faint very dark grayish brown (10YR 3/2) wormcasts; common medium distinct gray (10YR 6/1) iron depletions in the matrix; moderately acid; clear wavy boundary.

Bg2—20 to 27 inches; grayish brown (10YR 5/2) sand; weak medium and coarse subangular blocky structure; very friable; common fine and few medium roots; few faint very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; few distinct black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; common faint very dark grayish brown (10YR 3/2) wormcasts; few coarse faint dark grayish brown (10YR 4/2) iron depletions in the matrix; moderately acid; clear smooth boundary.

Bg3—27 to 37 inches; dark gray (10YR 4/1) loamy sand; weak coarse subangular blocky structure; very friable; few fine roots; common faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of peds; few fine prominent brown (7.5YR 5/4) masses of iron accumulation in the matrix; neutral; clear wavy boundary.

Cg1—37 to 61 inches; grayish brown (10YR 5/2) sand; single grain; loose; few prominent brown (7.5YR 5/4) masses of iron and manganese accumulation on faces of peds; common medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; slightly alkaline; abrupt wavy boundary.

2Cg2—61 to 80 inches; dark gray (10YR 4/1) silty clay; massive; very firm; few faint black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 52 inches
Thickness of the mollic epipedon: 10 to 15 inches
Depth to carbonates: 40 to 72 inches
Depth to clayey substratum: 60 to 80 inches

Ap and A horizons:
Color—hue of 10YR or N, value of 2 or 3, chroma of 0 to 2
Texture—loamy sand

Bg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—loamy sand or sand

Cg or C horizon:
Color—hue of 10YR to 5Y, value of 5 or 6, chroma of 1 to 4
Texture—loamy sand or sand

2Cg or 2C horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 to 3
Texture—silty clay, clay, or silty clay loam

Haskins Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate to rapid in the upper material and slow or very slow in the underlying material
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Landform: Lake plains, beach ridges on lake plains
Position on the landform: Slight rises, knolls, backslopes
Slope range: 0 to 6 percent
Adjacent soils: Fulton, Hoytville, Latty, Nappanee, Roselms

Taxonomic classification: Fine-loamy, mixed, mesic Aeric Epiaqualfs

Typical Pedon

Haskins loamy sand, 0 to 2 percent slopes, about 1.5 miles north-northwest of Cecil, in Crane Township, about 700 feet north and 690 feet west of the southeast corner of sec. 3, T. 3 N., R. 2 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; very friable; many fine and common medium roots; 15 percent intermixing of brown (10YR 5/3) subsoil material; 2 percent rock fragments; strongly acid; abrupt smooth boundary.

E—9 to 15 inches; brown (10YR 5/3) loamy sand; weak medium subangular blocky structure; very friable; few fine and medium roots; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine distinct light brownish gray (10YR 6/2) iron depletions in the matrix; moderately acid; clear smooth boundary.

Bt1—15 to 23 inches; dark yellowish brown (10YR 4/4) fine sandy loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct gray (10YR 5/1) iron depletions in the matrix; many fine distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; moderately acid; clear wavy boundary.

Bt2—23 to 34 inches; yellowish brown (10YR 5/4) fine sandy loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; many medium prominent yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine prominent very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; neutral; abrupt smooth boundary.

2Bt3—34 to 40 inches; dark yellowish brown (10YR 4/4) silty clay; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; very firm; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many fine prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions on faces of peds; strongly effervescent; slightly alkaline; clear wavy boundary.

2C1—40 to 62 inches; dark yellowish brown (10YR 4/4) silty clay; moderate coarse prismatic structure; very firm; many distinct grayish brown (10YR 5/2) coatings on vertical partings; few fine distinct black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions on vertical faces of peds; strongly effervescent; slightly alkaline; clear wavy boundary.

2C2—62 to 80 inches; dark yellowish brown (10YR 4/4) clay; massive; very firm; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions in seams; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 25 to 50 inches
Thickness of the A and E horizons: 8 to 17 inches
Depth to carbonates: 25 to 40 inches
Depth to the underlying till or lacustrine deposits: 20 to 40 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 or 2
Texture—loam or loamy sand
Content of rock fragments—0 to 10 percent

E horizon:
Color—hue of 10YR or 2.5Y, value of 5 or 6, chroma of 3 or 4

Texture—loamy sand or loamy fine sand
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—clay loam, sandy clay loam, fine sandy loam, loam, or the gravelly analogs of these textures
Content of rock fragments—0 to 20 percent

2Bt or 2Btg horizon and 2C or 2Cg horizon:
Color—hue of 10YR to 5Y or N, value of 4 or 5, chroma of 0 to 4
Texture—clay, silty clay, clay loam, or silty clay loam
Content of rock fragments—0 to 10 percent

Hoytville Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderately slow in the upper part of the subsoil and slow in the lower part of the subsoil and in the substratum
Parent material: Till
Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Latty, Nappanee

Taxonomic classification: Fine, illitic, mesic Mollic Epiaqualfs

Typical Pedon

Hoytville silty clay, about 3.3 miles northwest of Payne, in Harrison Township, about 1,540 feet east and 160 feet south of the northwest corner of sec. 29, T. 2 N., R. 1 E.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; firm; many fine and coarse roots; 1 percent rock fragments; slightly acid; clear smooth boundary.

Btg1—9 to 19 inches; dark gray (10YR 4/1) silty clay; moderate medium subangular blocky structure; firm; common fine and medium roots; few faint dark gray (10YR 4/1) clay films on vertical faces of peds; few faint very dark grayish brown (10YR 3/2) krotovinas; few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct dark grayish brown (2.5Y 4/2) iron depletions in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

Btg2—19 to 28 inches; gray (10YR 5/1) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common faint gray (10YR 5/1) clay films on vertical faces of peds; common medium prominent yellowish brown (10YR 5/6) and few medium prominent light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few fine faint very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

Btg3—28 to 39 inches; gray (10YR 5/1) silty clay; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common faint gray (10YR 5/1) clay films on vertical faces of peds; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine faint very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; few medium distinct white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions in the lower 4 inches; 2 percent rock fragments; neutral; gradual wavy boundary.

BC—39 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium and coarse subangular blocky structure; very firm; few fine roots; common distinct gray (10YR 5/1) coatings on vertical faces of peds; many coarse distinct gray (10YR 5/1) iron depletions in the matrix; few medium prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions on faces of peds; 5 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—46 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; massive with widely spaced vertical partings; very firm; few distinct gray (10YR 5/1) coatings on faces of vertical partings; common fine and medium prominent gray (2.5Y 5/1) iron depletions in the matrix; common medium prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions on faces of peds; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 36 to 55 inches
Thickness of the dark epipedon: 7 to 9 inches
Depth to carbonates: 36 to 55 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 or 2
Texture—silty clay or silty clay loam
Content of rock fragments—0 to 5 percent

Btg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—silty clay or clay
Content of rock fragments—2 to 5 percent

C or Cg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 to 6
Texture—clay, silty clay loam, clay loam, or silty clay
Content of rock fragments—2 to 10 percent

Knoxdale Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Adjacent soils: Flatrock, Rossburg, Shoals

Taxonomic classification: Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts

Typical Pedon

Knoxdale silt loam, occasionally flooded, about 2.5 miles northeast of Antwerp, in Carryall Township, about 1,190 feet south and 595 feet east of the northwest corner of sec. 24, T. 3 N., R. 1 E.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; common medium and many fine roots; many faint dark brown (10YR 3/3) organic coatings on faces of peds; neutral; clear smooth boundary.
Bw1—9 to 20 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct dark grayish brown (10YR 4/2) wormcasts; many faint brown (10YR 4/3) organic coatings on faces of peds; neutral; clear wavy boundary.
Bw2—20 to 35 inches; dark yellowish brown (10YR 4/4) loam; weak coarse subangular blocky structure; friable; few fine roots; common faint distinct brown (10YR 4/3) wormcasts; common faint brown (10YR 4/3) organic coatings on vertical faces of peds; few coarse faint distinct brown (10YR 5/3) and prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; neutral; clear wavy boundary.
C1—35 to 56 inches; dark yellowish brown (10YR 4/4) loam; massive with weak coarse subangular tendencies; friable; thin strata of silt loam; few fine roots; few faint brown (10YR 4/3) wormcasts; few faint brown (10YR 4/3) organic coatings on vertical partings; neutral; clear wavy boundary.
C2—56 to 80 inches; yellowish brown (10YR 5/4), stratified sandy loam and loam; massive; very friable; thin strata of loamy sand; 2 percent rock fragments; slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to carbonates: 40 to 60 inches

Ap horizon:
Color—hue of 10YR, value of 3 to 5, chroma of 2 to 4
Texture—silt loam
Content of rock fragments—0 to 5 percent

Bw horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silt loam or loam; thin strata of sandy loam or fine sandy loam in some pedons
Content of rock fragments—0 to 5 percent

C horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—commonly stratified; loam, sandy loam, silt loam, or fine sandy loam; thin strata of loamy sand or loamy fine sand
Content of rock fragments—0 to 15 percent

Landes Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the solum and rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Areas adjacent to the stream channel, slight rises
Slope range: 0 to 6 percent
Adjacent soils: Medway, Rossburg

Taxonomic classification: Coarse-loamy, mixed, mesic Fluventic Hapludolls

Typical Pedon

Landes loam, occasionally flooded, about 3.4 miles west of Cecil, in Crane Township, about 600 feet east and 160 feet south of the northwest corner of sec. 17, T. 3 N., R. 2 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; common fine and medium roots; few medium prominent white (10YR 8/1) aquatic shells; very slightly effervescent; moderately alkaline; clear smooth boundary.

A—10 to 18 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium and coarse subangular blocky structure parting to weak fine and medium granular; friable; few fine roots; common faint very dark gray (10YR 3/1) organic coatings on faces of peds; few medium prominent white (10YR 8/1) aquatic shells; very slightly effervescent; moderately alkaline; clear wavy boundary.

Bw—18 to 26 inches; brown (10YR 4/3) loam; weak fine and medium subangular blocky structure; friable; few fine roots; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few faint very dark grayish brown (10YR 3/2) wormcasts; common medium prominent white (10YR 8/1) aquatic shells; strongly effervescent; moderately alkaline; gradual smooth boundary.

C1—26 to 46 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; very friable; few fine roots; few distinct dark grayish brown (10YR 4/2) wormcasts; common medium prominent white (10YR 8/1) aquatic shells; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—46 to 80 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; few medium prominent white (10YR 8/1) aquatic shells; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 22 to 32 inches
Thickness of the mollic epipedon: 10 to 22 inches

Ap and A horizons:
Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3
Texture—loam

Bw horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4
Texture—loam, very fine sandy loam, fine sandy loam, or sandy loam

C horizon:
Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4
Texture—loam, sandy loam, fine sandy loam, very fine sandy loam, or sand

Latty Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow in the upper part of the subsoil and very slow in the lower part of the subsoil and in the substratum
Parent material: Lacustrine deposits or lacustrine deposits and the underlying till
Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Fulton, Nappanee, Paulding

Taxonomic classification: Fine, illitic, nonacid, mesic Typic Epiaquepts

Typical Pedon

Latty silty clay, about 0.8 mile southwest of Latty, in Paulding Township, about 320 feet west and 960 feet north of the southeast corner of sec. 35, T. 2 N., R. 2 E.

Ap1—0 to 6 inches; dark grayish brown (2.5Y 4/2) silty clay, light brownish gray (10YR 6/2) dry; moderate fine and medium angular blocky structure parting to moderate fine and medium granular; very firm; common coarse and many fine roots; slightly acid; gradual smooth boundary.

Ap2—6 to 11 inches; dark grayish brown (2.5Y 4/2) silty clay, light brownish gray (10YR 6/2) dry; moderate medium and fine angular blocky structure; very firm; common coarse and many fine roots; 10 percent intermixing of grayish brown (10YR 5/2) subsoil material; slightly acid; abrupt smooth boundary.

Bg1—11 to 16 inches; grayish brown (10YR 5/2) clay; moderate fine and medium angular blocky structure; very firm; few coarse and common fine roots; few faint dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; few

distinct dark grayish brown (2.5Y 4/2) krotovinas; common medium distinct gray (N 5/0) iron depletions in the matrix; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; neutral; gradual smooth boundary.

Bg2—16 to 21 inches; gray (5Y 5/1) clay; weak medium prismatic structure parting to moderate medium angular blocky; very firm; few fine and medium roots; few distinct grayish brown (2.5Y 5/2) pressure faces on vertical faces of primary peds; few distinct dark grayish brown (2.5Y 4/2) krotovinas; many medium prominent yellowish brown (10YR 5/4) and few medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) masses of iron and manganese accumulation in the matrix; neutral; gradual wavy boundary.

Bg3—21 to 33 inches; gray (5Y 5/1) clay; weak medium prismatic structure parting to moderate medium angular blocky; very firm; few fine roots; few faint grayish brown (2.5Y 5/2) pressure faces on vertical faces of primary peds; few distinct dark grayish brown (2.5Y 4/2) krotovinas; common medium and coarse prominent yellowish brown (10YR 5/4) and common coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; few fine prominent black (10YR 2/1) masses of iron and manganese accumulation in the matrix; neutral; gradual wavy boundary.

Bg4—33 to 42 inches; olive gray (5Y 5/2) clay; weak medium and coarse prismatic structure parting to moderate medium angular blocky; very firm; few fine roots; few faint gray (5Y 5/1) pressure faces on vertical faces of primary peds; few distinct dark grayish brown (2.5Y 4/2) krotovinas; common coarse prominent strong brown (7.5YR 5/6) and few medium prominent dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; neutral; gradual wavy boundary.

2BC—42 to 48 inches; yellowish brown (10YR 5/4) clay; weak medium subangular blocky structure; very firm; few fine roots; many coarse distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct white (10YR 8/2) masses of calcium carbonate accumulation occurring as concretions on faces of peds; 5 percent rock fragments; slightly effervescent; moderately alkaline; clear irregular boundary.

2C1—48 to 63 inches; yellowish brown (10YR 5/4) silty clay; massive with widely spaced vertical partings; very firm; few distinct gray (10YR 5/1) coatings on faces of vertical partings; many medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct white (10YR 8/2) masses of calcium carbonate accumulation occurring as concretions on faces of peds; 5 percent rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

2C2—63 to 80 inches; brown (10YR 5/3) silty clay; massive; very firm; many medium distinct gray (10YR 5/1) iron depletions in the matrix; 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 32 to 60 inches
Depth to till: 32 to more than 80 inches
Depth to carbonates: 32 to 48 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4, chroma of 1 or 2
Texture—silty clay or silty clay loam

Bg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—clay or silty clay

C or Cg horizon (if it occurs):
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 to 8
Texture—silty clay, clay, or silty clay loam

2C or 2Cg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 to 8
Texture—silty clay, clay, silty clay loam, or clay loam
Content of rock fragments—0 to 5 percent

Lucas Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow in the solum and moderate or moderately slow in the substratum
Parent material: Lacustrine deposits overlying loamy glaciofluvial deposits
Landform: Lake plains, stream terraces
Position on the landform: Slight rises, knolls, backslopes
Slope range: 0 to 12 percent
Adjacent soils: Fulton, Toledo

Taxonomic classification: Fine, illitic, mesic Oxyaquic Hapludalfs

Typical Pedon

Lucas silt loam, loamy substratum, 0 to 2 percent slopes, about 1 mile south of Oakwood, in Brown Township, about 2,160 feet east and 540 feet north of the southwest corner of sec. 35, T. 2 N., R. 4 E.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; common fine and medium roots; 10 percent intermixing of yellowish brown (10YR 5/4) subsoil material; 2 percent rock fragments; slightly acid; abrupt smooth boundary.

Bt1—9 to 20 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; firm; common fine and few medium roots; many faint brown (10YR 5/3) clay films on faces of peds; few fine faint brown (10YR 5/3) iron depletions in the matrix; few distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; moderately acid; gradual wavy boundary.

Bt2—20 to 28 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (10YR 5/3) clay films on faces of peds; common fine and medium faint brown (10YR 5/3) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; moderately acid; gradual wavy boundary.

Bt3—28 to 39 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; slightly acid; gradual wavy boundary.

Bt4—39 to 48 inches; yellowish brown (10YR 5/4) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium prominent yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; few distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; slightly acid; clear wavy boundary.

2C1—48 to 67 inches; dark yellowish brown (10YR 4/4) clay loam; massive; friable; thin strata of loam and sandy loam; few fine roots; common medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; few distinct black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; 2 percent rock fragments; 10 percent rock fragments in sandy loam strata; slightly acid; gradual wavy boundary.

2C2—67 to 80 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; thin strata of fine sandy loam and clay loam; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium prominent yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; 4 percent rock fragments; slightly acid.

Range in Characteristics

Thickness of the solum: 40 to 48 inches
Depth to carbonates: 50 to more than 80 inches
Depth to loamy substratum: 36 to 60 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 to 4
Texture—silt loam or silty clay loam

Bt horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 3 or 4
Texture—silty clay or clay

2C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2 to 6
Texture—clay loam, loam, silt loam, fine sandy loam, or sandy loam; commonly stratified
Content of rock fragments—0 to 15 percent

Medway Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part of the subsoil and moderate or moderately rapid in the lower part of the subsoil and in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Flat areas
Slope range: 0 to 2 percent
Adjacent soils: Landes, Rossburg

Taxonomic classification: Fine-loamy, mixed, mesic Fluvaquentic Hapludolls

Typical Pedon

Medway silt loam, occasionally flooded, about 2.6 miles west of Cecil, in Crane Township, about 900 feet north and 460 feet west of the southeast corner of sec. 8, T. 3 N., R. 2 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; few fine and medium roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; slightly alkaline; gradual smooth boundary.

A—10 to 19 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; few fine and medium roots; many faint very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear wavy boundary.

Bw1—19 to 25 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; few fine roots; common pores; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common faint dark brown (10YR 3/3) coatings in pores; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; neutral; clear wavy boundary.

Bw2—25 to 33 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; few pores; common distinct grayish brown (10YR 5/2) coatings on faces of peds; few faint dark brown (10YR 3/3) coatings in pores; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; neutral; gradual wavy boundary.

Bw3—33 to 41 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; few pores; few faint brown (10YR 5/3) coatings on vertical faces of peds; few distinct grayish brown (10YR 5/2) coatings in pores; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; neutral; gradual wavy boundary.

Bw4—41 to 47 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium and coarse subangular blocky structure; friable; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; neutral; gradual wavy boundary.

C1—47 to 58 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; very friable; few medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 5 percent rock fragments; slightly alkaline; clear wavy boundary.

C2—58 to 80 inches; yellowish brown (10YR 5/4) gravelly loamy coarse sand; single grain; loose; few fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; 25 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 28 to 50 inches
Thickness of the mollic epipedon: 10 to 23 inches

Ap and A horizons:

Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3
Texture—silt loam
Content of rock fragments—0 to 5 percent

Bw or Bg horizon:

Color—hue of 7.5YR to 2.5Y, value of 4 or 5, chroma of 2 to 4
Texture—commonly silt loam or loam; less commonly clay loam, silty clay loam, sandy loam, or fine sandy loam
Content of rock fragments—0 to 15 percent

C or Cg horizon:

Color—hue of 7.5YR to 2.5Y, value of 4 or 5, chroma of 1 to 6
Texture—loam, silt loam, clay loam, sandy loam, loamy coarse sand, loamy sand, or the gravelly analogs of these textures; commonly stratified
Content of rock fragments—0 to 15 percent above a depth of 40 inches and 0 to 35 percent below a depth of 40 inches

Mermill Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum
Parent material: Loamy deposits and the underlying till or lacustrine deposits
Landform: Lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Bixler, Granby, Haskins, Toledo

Taxonomic classification: Fine-loamy, mixed, mesic Mollic Epiaqualfs

Typical Pedon

Mermill loam, about 2 miles south of Arthur, in Brown Township, about 980 feet west and 280 feet south of the northeast corner of sec. 2, T. 2 N., R. 4 E.

Ap—0 to 9 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 common medium roots; neutral; abrupt smooth boundary.

Btg1—9 to 19 inches; gray (10YR 5/1) clay loam; moderate medium and coarse subangular blocky structure; friable; many fine and common medium roots; common faint gray (10YR 5/1) clay films on faces of peds; few very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds and in root channels; common fine distinct dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; 2 percent rock fragments; neutral; clear wavy boundary.

Btg2—19 to 30 inches; gray (10YR 5/1) clay loam; moderate medium and coarse subangular blocky structure; friable; many fine and common medium roots; many faint dark grayish brown (10YR 4/2) and few faint gray (10YR 6/1) clay films on faces of peds; few fine distinct black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; few faint very dark grayish brown (10YR 3/2) wormcasts; few coarse prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few medium and coarse faint gray (10YR 6/1) iron depletions in the matrix; neutral; clear wavy boundary.

Btg3—30 to 37 inches; grayish brown (10YR 5/2) clay loam; moderate medium and coarse subangular blocky structure; friable; common fine roots; common faint dark grayish brown (10YR 4/2) and gray (10YR 5/1) clay films on faces of peds; common fine and medium faint dark gray (10YR 4/1) iron depletions in the matrix; common fine and medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; neutral; clear smooth boundary.

2BCg—37 to 44 inches; grayish brown (10YR 5/2) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; few fine roots; common faint gray (10YR 5/1) coatings on vertical faces of peds; many medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; neutral; clear wavy boundary.

2C1—44 to 54 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; many fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; neutral; clear wavy boundary.

2C2—54 to 80 inches; dark yellowish brown (10YR 4/4) silty clay; massive; firm; common fine distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 30 to 48 inches
Thickness of the dark epipedon: 7 to 9 inches
Depth to till or lacustrine material: 20 to 40 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 5 percent

Btg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 2
Texture—clay loam, sandy clay loam, or loam
Content of rock fragments—0 to 10 percent

2BCg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 2
Texture—silty clay, clay, silty clay loam, or clay loam
Content of rock fragments—0 to 10 percent

2C or 2Cg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 to 6

Texture—silty clay, clay, silty clay loam, or clay loam
Content of rock fragments—0 to 5 percent

Millgrove Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate in the loamy solum; moderately rapid in the loamy, sandy, or gravelly substratum; and slow in the underlying till
Parent material: Loamy material and the underlying stratified sandy, gravelly, and loamy deposits overlying till
Landform: Stream terraces, lake plains
Position on the landform: Flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Belmore, Haskins, Oshtemo

Taxonomic classification: Fine-loamy, mixed, mesic Typic Argiaquolls

Typical Pedon

Millgrove loam, till substratum, about 1.75 miles northeast of Cecil, in Crane Township, about 2,560 feet west and 280 feet south of the northeast corner of sec. 12, T. 3 N., R. 2 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; common fine and medium roots; 4 percent rock fragments; moderately acid; clear wavy boundary.
A—8 to 15 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure; firm; few medium and common fine roots; common faint black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; few fine faint grayish brown (10YR 5/2) iron depletions in the matrix; 4 percent rock fragments; moderately acid; clear smooth boundary.
Btg1—15 to 23 inches; dark gray (10YR 4/1) sandy clay loam; moderate medium and coarse subangular blocky structure; firm; few fine and medium roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; common faint very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; common faint black (10YR 2/1) masses of iron and manganese accumulation on faces of peds; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 10 percent rock fragments; moderately acid; clear wavy boundary.
Btg2—23 to 36 inches; dark gray (10YR 4/1) sandy clay loam; weak fine and medium subangular blocky structure; friable; few fine and medium roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; few fine distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 10 percent rock fragments; slightly acid; clear wavy boundary.
2BCtg—36 to 50 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; weak coarse subangular blocky structure; very friable; few faint dark grayish brown (10YR 4/2) clay films on vertical faces of peds; common fine faint grayish brown (10YR 5/2) iron depletions in the matrix; few fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; 20 percent rock fragments; neutral; clear smooth boundary.
2Cg1—50 to 61 inches; dark grayish brown (10YR 4/2), stratified gravelly sandy loam, loam, and silt loam; massive; friable; few medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 25 percent rock fragments; strongly effervescent; slightly alkaline; clear wavy boundary.
3Cg2—61 to 80 inches; dark grayish brown (10YR 4/2) clay loam; massive; firm; common fine and medium distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 10 percent rock fragments; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 28 to 55 inches
Thickness of the mollic epipedon: 10 to 18 inches
Depth to carbonates: 24 to 60 inches
Depth to till substratum: 60 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 10 percent

Btg horizon:
Color—hue of 10YR to 5Y, value of 4 or 5, chroma of 1 or 2
Texture—clay loam, sandy clay loam, or loam
Content of rock fragments—2 to 15 percent

2Btg or 2BCtg horizon:
Color—hue of 10YR to 5Y, value of 4 or 5, chroma of 1 or 2

Texture—loam, sandy loam, sandy clay loam, or the gravelly or very gravelly analogs of these textures
Content of rock fragments—10 to 40 percent

2Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—loam, sandy loam, or the gravelly or very gravelly analogs of these textures; strata of loam, silt loam, sandy loam, sand, or loamy sand
Content of rock fragments—10 to 40 percent

3Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 or 2
Texture—clay loam, silty clay loam, or silty clay
Content of rock fragments—0 to 10 percent

Nappanee Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Slow
Parent material: Till
Landform: Lake plains
Position on the landform: Slight rises, flat areas, knolls, backslopes
Slope range: 0 to 6 percent
Adjacent soils: Haskins, Hoytville, Latty, St. Clair

Taxonomic classification: Fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Nappanee silty clay loam, 0 to 2 percent slopes, about 3.8 miles southwest of Paulding, in Paulding Township, about 2,420 feet north and 460 feet east of the southwest corner of sec. 21, T. 2 N., R. 2 E.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; weak medium and coarse subangular blocky structure parting to moderate fine and medium granular; friable; few coarse and common fine and medium roots; 1 percent rock fragments; neutral; abrupt smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) silty clay; strong medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many distinct grayish brown (10YR 5/2) clay films on vertical faces of peds; common distinct dark grayish brown (10YR 4/2) organic coatings on vertical faces of peds; many medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few fine distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; gradual wavy boundary.

Bt2—16 to 21 inches; brown (10YR 5/3) silty clay; strong medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; few fine distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; gradual wavy boundary.

Bt3—21 to 27 inches; brown (10YR 5/3) silty clay; moderate medium subangular blocky structure; very firm; few fine roots; many faint grayish brown (10YR 5/2) clay films on faces of peds; common distinct gray (10YR 5/1) coatings on vertical faces of peds; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; 3 percent rock fragments; slightly alkaline; gradual wavy boundary.

BC—27 to 35 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure; very firm; few fine roots; common distinct gray (10YR 5/1) coatings on vertical faces of peds; common fine and medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine distinct very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; common medium prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions in the matrix; 3 percent rock fragments; slightly effervescent; slightly alkaline; gradual wavy boundary.

C—35 to 80 inches; dark yellowish brown (10YR 4/4) silty clay loam; massive with widely spaced vertical partings; very firm; few distinct gray (10YR 5/1) coatings on faces of partings; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the

matrix; many medium prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as concretions in the matrix; 3 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 50 inches
Depth to carbonates: 20 to 30 inches

Ap horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3
Texture—silty clay loam or 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 1 to 4
Texture—silty clay or clay
Content of rock fragments—0 to 5 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, silty clay, clay, or clay loam
Content of rock fragments—0 to 5 percent

Oshtemo Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the solum, very rapid in the sandy and gravelly substratum, and slow in the till
Parent material: Loamy and sandy material overlying till
Landform: Stream terraces, beach ridges on lake plains
Position on the landform: Knolls, backslopes
Slope range: 2 to 6 percent
Adjacent soils: Lucas, Millgrove

Taxonomic classification: Coarse-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Oshtemo sandy loam, till substratum, 2 to 6 percent slopes, about 3.5 miles northeast of Antwerp, in Crane Township, about 1,900 feet east and 360 feet north of the southwest corner of sec. 18, T. 3 N., R. 2 E.

Ap—0 to 8 inches; brown (10YR 4/3) sandy loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; many fine and common medium and coarse roots; 2 percent rock fragments; strongly acid; abrupt wavy boundary.
Bt1—8 to 17 inches; brown (7.5YR 5/4) sandy loam; moderate fine and medium subangular blocky structure; friable; few fine and medium distinct strong brown (7.5YR 5/6) mottles in the matrix; few medium and coarse distinct brown (10YR 5/3) mottles in the matrix; common fine and few medium roots; common faint brown (7.5YR 4/4) clay films on faces of peds; few prominent very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; 2 percent rock fragments; moderately acid; clear wavy boundary.
Bt2—17 to 26 inches; brown (7.5YR 5/4) sandy loam; moderate fine and medium subangular blocky structure; friable; few fine distinct brown (10YR 5/3) mottles in the matrix; few fine roots; common distinct dark brown (7.5YR 3/4) clay films on faces of peds; common prominent very dark gray (10YR 3/1) masses of iron and manganese accumulation in the matrix; 5 percent rock fragments; moderately acid; clear smooth boundary.
Bt3—26 to 35 inches; brown (7.5YR 4/4) sandy clay loam; weak medium and coarse subangular blocky structure; friable; common faint dark brown (7.5YR 3/4) clay films on faces of peds and clay bridging between sand grains; 10 percent rock fragments; moderately acid; clear smooth boundary.
Bt4—35 to 42 inches; dark brown (7.5YR 3/4) coarse sandy loam; weak coarse subangular blocky structure; very friable; common faint dark brown (7.5YR 3/4) clay bridging between sand grains; 10 percent rock fragments; slightly acid; gradual wavy boundary.
BC—42 to 68 inches; yellowish brown (10YR 5/4) sandy loam; massive; very friable; 5 percent rock fragments; neutral; gradual wavy boundary.
2C—68 to 74 inches; brown (10YR 5/3) very gravelly loamy sand; single grain; loose; 40 percent rock fragments; strongly effervescent; slightly alkaline; abrupt smooth boundary.
3Cg—74 to 80 inches; dark gray (5Y 4/1) silty clay; massive; very firm; 5 percent rock fragments; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 40 to 70 inches
Depth to carbonates: 40 to 70 inches
Depth to till substratum: 60 to 80 inches

Ap horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 2 or 3

Texture—sandy loam
Content of rock fragments—1 to 10 percent

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, chroma of 3 or 4
Texture—sandy loam, coarse sandy loam, sandy clay loam, or the gravelly analogs of these textures
Content of rock fragments—1 to 20 percent

2C horizon:
Color—hue of 10YR, value of 5 or 6, chroma of 2 to 4
Texture—loamy sand, loamy coarse sand, sand, or the gravelly or very gravelly analogs of these textures
Content of rock fragments—10 to 50 percent

3Cg or 3C horizon:
Color—hue of 10YR to 5Y, value of 4 or 5, chroma of 1 to 3
Texture—silty clay, silty clay loam, or clay loam
Content of rock fragments—0 to 10 percent

Ottokee Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Rapid
Parent material: Beach deposits or eolian deposits
Landform: Beach ridges, dunes
Position on the landform: Knolls, rises
Slope range: 0 to 6 percent
Adjacent soils: Bixler, Granby, Tedrow

Taxonomic classification: Mixed, mesic Aquic Udipsamments

Typical Pedon

Ottokee fine sand, 0 to 6 percent slopes; in Fulton County, about 5 miles south of Delta, in York Township, about 2,500 feet south and 1,720 feet east of the northwest corner of sec. 12, T. 6 N., R. 7 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; slightly acid; abrupt smooth boundary.
E1—8 to 22 inches; yellowish brown (10YR 5/4) fine sand; single grain; loose; slightly acid; clear wavy boundary.
E2—22 to 27 inches; light yellowish brown (10YR 6/4) fine sand; single grain; loose; many fine prominent yellowish red (5YR 5/8 and 4/6) masses of iron accumulation in the matrix; common fine faint pale brown (10YR 6/3) iron depletions in the matrix; areas with numerous dark iron and manganese concretions; slightly acid; gradual wavy boundary.
E3—27 to 33 inches; pale brown (10YR 6/3) fine sand; single grain; loose; few fine distinct gray (10YR 6/1) iron depletions in the matrix; fine and medium prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; masses of iron accumulation ranging from few to many within a short distance in the horizon; slightly acid; clear wavy boundary.
E4—33 to 39 inches; light brownish gray (10YR 6/2) fine sand; single grain; loose; fine and medium prominent yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8) masses of iron accumulation in the matrix; masses of iron accumulation ranging from few to many within a short distance in the horizon; neutral; abrupt irregular boundary with tongues extending into the horizon below.
E&Bt—39 to 60 inches; light brownish gray (10YR 6/2) loamy fine sand in the upper part and pale brown (10YR 6/3) loamy fine sand in the lower part (E); single grain; loose; some discontinuous strong brown (7.5YR 5/8) lamellae of loamy fine sand $^{1}/_{8}$ to $^{3}/_{4}$ inch thick that increase in thickness with increasing depth (Bt); weak fine subangular blocky structure in some parts and massive in other parts; very friable; neutral; clear wavy boundary.
Cg—60 to 78 inches; gray (10YR 5/1) fine sand; single grain; loose; many medium prominent light olive brown (2.5Y 5/6) masses of iron accumulation in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 90 inches
Depth to carbonates: 40 to 90 inches

Ap horizon:
Color—hue of 10YR, value of 3 or 4, chroma of 2 or 3
Texture—fine sand or loamy sand
Content of rock fragments—0 to 5 percent

E horizon:
Color—hue of 10YR or 7.5YR, value of 5 or 6, chroma of 4 to 8; with depth, ranges to hue of 2.5Y, value of 4 to 6, chroma of 2 to 4
Texture—loamy sand, sand, loamy fine sand, or fine sand
Content of rock fragments—0 to 6 percent

E&Bt horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6,

chroma of 1 to 3 (E part); hue of 10YR to 5YR, value of 3 to 6, chroma of 4 to 8 (Bt part)
Texture—loamy sand, sand, loamy fine sand, or fine sand
Content of rock fragments—0 to 6 percent

C or Cg horizon:
Color—hue of 10YR to 5Y or N, value of 5 or 6, chroma of 0 to 3
Texture—sand or fine sand
Content of rock fragments—0 to 2 percent

Paulding Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Very slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Extensive flat areas, depressions, drainageways
Slope range: 0 to 2 percent
Adjacent soils: Latty, Nappanee, Roselms

Taxonomic classification: Very fine, illitic, nonacid, mesic Typic Epiaquepts

Typical Pedon

Paulding clay, about 1 mile northwest of Junction, in Auglaize Township, about 2,480 feet south and 130 feet east of the northwest corner of sec. 24, T. 3 N., R. 3 E.

Ap—0 to 6 inches; dark gray (N 4/0) clay, gray (10YR 6/1) dry; weak coarse granular structure; very firm; neutral; abrupt smooth boundary.
Bg1—6 to 9 inches; gray (N 5/0) clay; weak medium prismatic structure parting to weak fine angular blocky; very firm; many fine prominent yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; slightly acid; gradual smooth boundary.
Bg2—9 to 22 inches; gray (N 5/0) clay; moderate coarse prismatic structure parting to strong medium angular blocky; very firm; common coarse prominent yellowish brown (10YR 5/8) masses of iron accumulation in the matrix; neutral; gradual smooth boundary.
Bg3—22 to 30 inches; gray (N 5/0) clay; weak very coarse prismatic structure parting to weak coarse angular blocky; very firm; many fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; neutral; gradual smooth boundary.
BCg—30 to 48 inches; gray (5Y 5/1) clay; weak very coarse prismatic structure in the upper part; massive in the lower part; very firm; many fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; slightly alkaline; clear wavy boundary.
Cg—48 to 63 inches; gray (5Y 5/1) clay; massive; very firm; many coarse prominent dark yellowish brown (10YR 4/4) masses of iron accumulation in the matrix; few coarse prominent light gray (10YR 7/2) masses of calcium carbonate accumulation in the matrix; strongly effervescent; moderately alkaline; clear smooth boundary.
C—63 to 80 inches; dark yellowish brown (10YR 4/4) clay; massive; weakly laminated; firm; many medium prominent gray (N 5/0) iron depletions in the matrix; few medium distinct gray (10YR 6/1) masses of calcium carbonate accumulation on laminae in the matrix; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 25 to 55 inches
Depth to carbonates: 25 to 55 inches

Ap horizon:
Color—hue of 10YR, 2.5Y, or N, value of 4, chroma of 0 to 2
Texture—clay

Bg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 2
Texture—clay

C and Cg horizons:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 4
Texture—clay

Rimer Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid in the sandy material, moderately rapid in the loamy subsoil, and slow or very slow in the underlying material
Parent material: Beach deposits and the underlying lacustrine deposits or till
Landform: Lake plains, beach ridges on lake plains
Position on the landform: Slight rises, knolls, backslopes, summits
Slope range: 0 to 6 percent
Adjacent soils: Fulton, Haskins, Roselms, Tedrow

Taxonomic classification: Loamy, mixed, mesic Aquic Arenic Hapludalfs

Typical Pedon

Rimer loamy sand, 0 to 2 percent slopes, about 1.5 miles west of Arthur, in Auglaize Township, about 2,040 feet east and 640 feet north of the southwest corner of sec. 22, T. 3 N., R. 4 E.

Ap—0 to 9 inches; brown (10YR 4/3) loamy sand, pale brown (10YR 6/3) dry; weak medium and coarse granular structure; very friable; many fine and common medium roots; few faint dark brown (10YR 3/3) organic coatings; strongly acid; clear wavy boundary.

A/E—9 to 17 inches; brown (10YR 4/3) (80 percent) and yellowish brown (10YR 5/4) (20 percent) loamy sand; weak medium and coarse granular structure; very friable; common medium and fine roots; few faint brown (10YR 4/3) organic coatings; 2 percent rock fragments; strongly acid; clear wavy boundary.

E—17 to 23 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few fine and medium roots; few faint brown (10YR 4/3) organic coatings; few fine prominent very dark grayish brown (7.5YR 3/2) masses of iron and manganese accumulation on faces of peds; common medium distinct light brownish gray (10YR 6/2) iron depletions in the matrix; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; 2 percent rock fragments; strongly acid; clear smooth boundary.

Bt1—23 to 33 inches; dark yellowish brown (10YR 4/4) sandy loam; weak coarse prismatic structure parting to weak medium subangular blocky; friable; few fine roots; many distinct light brownish gray (10YR 6/2) clay films on vertical faces of prisms; few distinct very dark grayish brown (10YR 3/2) organic coatings in old root channels; common medium distinct gray (10YR 6/1) iron depletions in the matrix; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; 2 percent rock fragments; moderately acid; abrupt smooth boundary.

2Bt2—33 to 38 inches; brown (10YR 4/3) silty clay; weak coarse prismatic structure parting to strong medium subangular blocky; very firm; few fine and medium roots on vertical faces of prisms; many distinct gray (10YR 6/1) clay films on faces of peds; few faint yellowish brown (10YR 5/4) sand coatings on vertical faces of prisms; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; slightly acid; gradual wavy boundary.

2BC—38 to 45 inches; brown (10YR 4/3) silty clay; strong coarse prismatic structure parting to strong medium subangular blocky; very firm; few fine roots on vertical faces of prisms; many distinct gray (10YR 6/1) coatings on faces of peds; few faint yellowish brown (10YR 5/4) sand coatings on vertical faces of prisms; few fine faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few distinct light gray (10YR 7/1) masses of calcium carbonate accumulation occurring as nodules on faces of peds; strongly effervescent; slightly alkaline; gradual wavy boundary.

2C—45 to 80 inches; brown (10YR 4/3) silty clay; massive; very firm; few faint dark yellowish brown (10YR 4/4) pressure faces on faces of widely spaced vertical partings; common fine and medium faint yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; common medium and coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; few prominent white (10YR 8/1) masses of calcium carbonate accumulation occurring as nodules on partings; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the A and E horizons: 20 to 32 inches
Thickness of the solum: 25 to 48 inches
Depth to fine textured material: 25 to 40 inches

Ap horizon:
- Color—hue of 10YR, value of 3 to 5, chroma of 1 to 3
- Texture—loamy sand
- Content of rock fragments—0 to 3 percent

E horizon:
- Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 2 to 4
- Texture—loamy sand, loamy fine sand, or 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—sandy loam, fine sandy loam, and thin subhorizons of sandy clay 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—silty clay, clay, silty clay loam, or clay loam
Content of rock fragments—0 to 3 percent

2C or 2Cg horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 to 4
Texture—silty clay, clay, silty clay loam, or clay loam
Content of rock fragments—0 to 8 percent

Roselms Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Very slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Slight rises, knolls, flat areas, backslopes
Slope range: 0 to 6 percent
Adjacent soils: Broughton, Haskins, Paulding

Taxonomic classification: Very fine, illitic, mesic Aeric Epiaqualfs

Typical Pedon

Roselms silty clay loam, 0 to 2 percent slopes, about 0.8 mile northeast of Cecil, in Crane Township, about 1,600 feet north and 880 feet west of the southeast corner of sec. 11, T. 3 N., R. 2 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, pale brown (10YR 6/3) dry; weak medium and coarse subangular blocky structure parting to moderate fine and medium granular; firm; many fine and common medium roots; 10 percent intermixing of subsoil material; moderately acid; abrupt smooth boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/4) clay; moderate fine and medium subangular blocky structure; very firm; common fine and few medium roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; strongly acid; gradual wavy boundary.

Bt2—17 to 23 inches; brown (10YR 5/3) clay; moderate medium subangular blocky structure; very firm; common fine and few medium roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; few distinct gray (10YR 5/1) pressure faces on vertical faces of peds; common fine distinct gray (10YR 5/1) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; slightly acid; clear wavy boundary.

Bt3—23 to 32 inches; brown (10YR 5/3) clay; weak medium and coarse subangular blocky structure; very firm; common fine roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; few fine and medium faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of peds; common fine and medium distinct grayish brown (2.5Y 5/2) iron depletions in the matrix; common fine and medium distinct white (10YR 8/1) masses of calcium carbonate accumulation occurring as nodules on faces of peds; strongly effervescent; moderately alkaline; gradual wavy boundary.

BC—32 to 53 inches; light olive brown (2.5Y 5/4) clay; weak medium and coarse subangular blocky structure; very firm; few fine roots in the upper part; few prominent grayish brown (10YR 5/2) clay films on vertical faces of peds; common medium prominent grayish brown (10YR 5/2) iron depletions in the matrix; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct very pale brown (10YR 7/3) masses of calcium carbonate accumulation occurring as crystals on faces of peds; strongly effervescent; moderately alkaline; gradual wavy boundary.

C—53 to 80 inches; light olive brown (2.5Y 5/4) clay; massive; weak and thin laminations; very firm; common medium prominent grayish brown (10YR 5/2) iron depletions in the matrix; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct very pale brown (10YR 7/3) masses of calcium carbonate accumulation occurring as crystals on faces of peds; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 25 to 55 inches
Depth to carbonates: 16 to 35 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 or 2
Texture—silty clay loam, silty clay, or loam

Bt or Btg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 4
Texture—clay

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 4
Texture—clay

Rossburg Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the solum and moderately rapid or rapid in the substratum
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Slight rises, areas adjacent to the stream channel
Slope range: 0 to 2 percent
Adjacent soils: Landes, Medway

Taxonomic classification: Fine-loamy, mixed, mesic Fluventic Hapludolls

Typical Pedon

Rossburg silt loam, occasionally flooded, about 4.1 miles northeast of Antwerp, in Crane Township, about 2,540 feet west and 1,340 feet south of the northeast corner of sec. 18, T. 3 N., R. 2 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; common fine and medium roots; neutral; clear smooth boundary.
A—10 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak medium angular blocky structure parting to weak medium and fine granular; friable; few medium and common fine roots; neutral; clear smooth boundary.
Bw1—15 to 32 inches; brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common pores; many faint dark grayish brown (10YR 4/2) organic coatings on faces of peds and in pores; neutral; clear wavy boundary.
Bw2—32 to 48 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; friable; few fine roots; few pores; common faint brown (10YR 4/3) organic coatings on vertical faces of peds and in pores; neutral; clear wavy boundary.
C—48 to 80 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; very friable; strata of loam; few fine roots in the upper part; few medium distinct white (10YR 8/1) aquatic shells; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 23 inches
Thickness of the solum: 24 to 60 inches

Ap and A horizons:
Color—hue of 10YR, value and chroma of 2 or 3
Texture—silt loam
Content of rock fragments—0 to 5 percent

Bw horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam or loam; sandy loam or fine sandy loam in the lower part in some pedons
Content of rock fragments—0 to 10 percent

C horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 to 6
Texture—commonly stratified; silt loam, loam, sandy loam, or fine sandy loam; strata of loamy sand, sand, or the gravelly or very gravelly analogs of these textures
Content of rock fragments—0 to 20 percent above a depth of 48 inches and 0 to 50 percent in individual strata below a depth of 48 inches

Saranac Series

Depth class: Very deep
Drainage class: Poorly drained and very poorly drained
Permeability: Moderately slow
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Depressions, flat areas
Slope range: 0 to 2 percent
Adjacent soils: Defiance, Flatrock

Taxonomic classification: Fine, mixed, mesic Fluvaquentic Endoaquolls

Typical Pedon

Saranac silty clay loam, occasionally flooded, about 0.75 mile east of Knoxdale, in Crane Township, about 1,960 feet west and 1,280 feet north of the southeast corner of sec. 20, T. 3 N., R. 2 E.

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine and medium granular structure; firm; few medium and many fine roots; slightly acid; gradual smooth boundary.
Bg1—11 to 16 inches; dark gray (5Y 4/1) silty clay; weak fine and medium subangular blocky structure; firm; few fine roots; few prominent very

dark grayish brown (10YR 3/2) krotovinas; few medium prominent olive brown (2.5Y 4/4) masses of iron accumulation in the matrix; slightly acid; gradual wavy boundary.

Bg2—16 to 26 inches; gray (5Y 5/1) silty clay; moderate fine and medium subangular blocky structure; firm; few fine roots; few fine prominent olive brown (2.5Y 4/4) masses of iron accumulation in the matrix; common prominent strong brown (7.5YR 5/6) masses of iron and manganese accumulation in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.

Bg3—26 to 38 inches; olive gray (5Y 5/2) silty clay; weak medium and coarse subangular blocky structure; firm; few fine roots; common medium prominent gray (10YR 5/1) iron depletions in the matrix; common fine prominent olive brown (2.5Y 4/4) masses of iron accumulation in the matrix; many prominent strong brown (7.5YR 5/6) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.

Bg4—38 to 46 inches; olive gray (5Y 5/2) silty clay; weak medium subangular blocky structure; firm; few fine roots; common fine and medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common prominent brown (7.5YR 4/4) masses of iron and manganese accumulation in the matrix; 2 percent rock fragments; neutral; gradual wavy boundary.

Cg1—46 to 70 inches; grayish brown (2.5Y 5/2) silty clay; massive; firm; many fine distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; common prominent brown (7.5YR 4/4) and strong brown (7.5YR 5/6) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; gradual wavy boundary.

Cg2—70 to 80 inches; dark grayish brown (2.5Y 4/2) silty clay; massive; firm; common fine and medium distinct gray (N 5/0) iron depletions in the matrix; 3 percent rock fragments; slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 30 to 50 inches
Thickness of the mollic epipedon: 10 to 15 inches
Depth to carbonates: 50 to 70 inches

Ap horizon:
Color—hue of 10YR, value of 3, chroma of 1 or 2
Texture—silty clay loam

Bg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 2
Texture—silty clay, clay, silty clay loam, or clay loam

Cg horizon:
Color—hue of 10YR to 5Y, value of 4 to 6, chroma of 1 or 2
Texture—silty clay or clay; less commonly silty clay loam or clay loam

Shoals Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Slight rises, flat areas
Slope range: 0 to 2 percent
Adjacent soils: Flatrock, Knoxdale, Saranac, Wabasha

Taxonomic classification: Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents

Taxadjunct features: The Shoals soils in Paulding County have higher chroma in the Bw horizons than is defined as the range for the series. These soils are classified as fine-loamy, mixed, nonacid, mesic Aquic Hapludalfs.

Typical Pedon

Shoals silt loam, occasionally flooded, about 2.5 miles northwest of Knoxdale, in Crane Township, about 1,280 feet north and 820 feet east of the southwest corner of sec. 6, T. 3 N., R. 2 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; many fine and common medium roots; few faint dark grayish brown (10YR 4/2) wormcasts; 1 percent rock fragments; neutral; clear wavy boundary.

Bg—8 to 12 inches; dark grayish brown (10YR 4/2) silt loam; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; common fine roots; few fine distinct yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.

Bw1—12 to 18 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure; friable; common fine roots; many faint grayish brown (10YR 5/2) coatings on faces of peds; many fine faint grayish brown (10YR 5/2) iron depletions in the matrix; many distinct very dark grayish brown (10YR 3/2) masses of iron and

manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.
Bw2—18 to 26 inches; brown (10YR 5/3) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; common fine faint grayish brown (10YR 5/2) coatings on faces of peds; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; many fine distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.
Bw3—26 to 44 inches; yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; friable; few fine roots; few medium distinct grayish brown (10YR 5/2) coatings on vertical faces of peds; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; clear wavy boundary.
C1—44 to 50 inches; yellowish brown (10YR 5/6) loam; massive; friable; few fine roots; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; many fine and medium prominent grayish brown (10YR 5/2) iron depletions in the matrix; common fine prominent very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; 1 percent rock fragments; neutral; abrupt wavy boundary.
C2—50 to 80 inches; yellowish brown (10YR 5/4) loam; massive; friable; thin strata of silt loam and sandy loam; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; 5 percent rock fragments; neutral.

Range in Characteristics

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 3 percent

Bg horizon:
Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 2
Texture—silt loam, loam, or clay loam
Content of rock fragments—0 to 3 percent

Bw horizon:
Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—silt loam, loam, or clay loam
Content of rock fragments—0 to 3 percent

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 5 or 6, chroma of 1 to 6
Texture—loam, silt loam, or sandy loam; commonly with thin strata
Content of rock fragments—0 to 10 percent

St. Clair Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Parent material: Till
Landform: Lake plains
Position on the landform: Backslopes, knolls, dissected areas along streams
Slope range: 2 to 35 percent
Adjacent soils: Nappanee

Taxonomic classification: Fine, illitic, mesic Oxyaquic Hapludalfs

Typical Pedon

St. Clair silty clay loam, 6 to 12 percent slopes, eroded, about 1 mile east-northeast of Paulding, in Jackson Township, about 900 feet south and 360 feet east of the northwest corner of sec. 8, T. 2 N., R. 3 E.

Ap—0 to 6 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; firm; common fine and few medium roots; 15 percent intermixing of yellowish brown (10YR 5/4) subsoil material; 2 percent rock fragments; slightly acid; abrupt smooth boundary.
Bt1—6 to 17 inches; yellowish brown (10YR 5/4) silty clay; moderate fine and medium subangular blocky structure; firm; common fine roots; common faint yellowish brown (10YR 5/4) and brown (10YR 5/3) clay films on faces of peds; common fine and medium faint brown (10YR 5/3) iron depletions in the lower part of the matrix; common medium distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; 2 percent rock fragments; slightly acid; clear wavy boundary.
Bt2—17 to 22 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common

distinct grayish brown (10YR 5/2) and many faint brown (10YR 5/3) clay films on faces of peds; many fine distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; many medium distinct black (10YR 2/1) masses of iron and manganese accumulation in the matrix; 3 percent rock fragments; neutral; clear wavy boundary.

BC—22 to 32 inches; yellowish brown (10YR 5/4) silty clay; moderate coarse prismatic structure parting to moderate fine and medium subangular blocky; firm; few fine roots on faces of prisms; common faint brown (10YR 5/3) and many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation on faces of prisms; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; 5 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

C1—32 to 40 inches; yellowish brown (10YR 5/4) clay loam; massive; very firm; grayish brown (10YR 5/2) coatings on vertical partings; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; 5 percent rock fragments; strongly effervescent; slightly alkaline; gradual wavy boundary.

C2—40 to 80 inches; dark yellowish brown (10YR 4/4) clay loam; massive; very firm; distinct grayish brown (10YR 5/2) coatings on vertical partings; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; 5 percent rock fragments; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 20 to 32 inches
Depth to carbonates: 9 to 30 inches

Ap or A horizon:
Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 1 to 3; value of 3 to 5 in severely eroded areas
Texture—silty clay loam or silty clay
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 or 4
Texture—silty clay or clay
Content of rock fragments—0 to 5 percent

C horizon:
Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 1 to 4
Texture—silty clay, clay loam, or silty clay loam
Content of rock fragments—0 to 5 percent

Tedrow Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Rapid
Parent material: Beach deposits
Landform: Beach ridges
Position on the landform: Flat areas, slight rises
Slope range: 0 to 3 percent
Adjacent soils: Bixler, Granby, Ottokee

Taxonomic classification: Mixed, mesic Aquic Udipsamments

Typical Pedon

Tedrow loamy sand, 0 to 3 percent slopes, about 2.5 miles south of Arthur, in Brown Township, about 2,560 feet south and 2,280 feet east of the northwest corner of sec. 1, T. 2 N., R. 4 E.

Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; very friable; few medium and common fine roots; slightly acid; abrupt smooth boundary.

Bw1—12 to 19 inches; yellowish brown (10YR 5/4) loamy sand; weak fine and medium subangular blocky structure; very friable; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in old root channels; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation in the matrix; moderately acid; gradual wavy boundary.

Bw2—19 to 24 inches; yellowish brown (10YR 5/4) sand; weak fine and medium subangular blocky structure; very friable; few fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings in old root channels; many medium and coarse distinct grayish brown (10YR 5/2) iron depletions in the matrix; few medium prominent strong brown (7.5YR 5/6) masses of iron

accumulation in the matrix; moderately acid; gradual wavy boundary.
Bw3—24 to 31 inches; yellowish brown (10YR 5/4) sand; weak medium subangular blocky structure; very friable; few fine roots; common fine and medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; common fine distinct brown (7.5YR 4/4) masses of iron accumulation in the matrix; many medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; neutral; gradual wavy boundary.
Bw4—31 to 44 inches; brown (10YR 5/3) sand; weak medium subangular blocky structure; very friable; few medium distinct brown (7.5YR 4/4) masses of iron accumulation in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; common medium and coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; neutral; gradual wavy boundary.
C—44 to 60 inches; brown (10YR 5/3) sand; single grain; loose; common medium and coarse faint grayish brown (10YR 5/2) iron depletions in the matrix; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; single grain; loose; neutral; gradual wavy boundary.
Cg—60 to 80 inches; grayish brown (10YR 5/2) sand; single grain; loose; few fine prominent brown (7.5YR 4/4) masses of iron accumulation in the matrix; very slightly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 24 to 54 inches
Depth to carbonates: 36 to 60 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 3 or 4, chroma of 1 to 3
Texture—loamy sand

Bw horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, chroma of 3 to 6; chroma of 1 to 6 in the lower part
Texture—loamy sand, sand, loamy fine sand, or fine sand

C or Cg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 4
Texture—sand or fine sand

Toledo Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Drainageways, extensive flat areas
Slope range: 0 to 2 percent
Adjacent soils: Fulton, Haskins, Latty, Mermill

Taxonomic classification: Fine, illitic, nonacid, mesic Mollic Endoaquepts

Typical Pedon

Toledo silty clay, about 3.3 miles north-northeast of Oakwood, in Brown Township, about 1,460 feet west and 180 feet south of the northeast corner of sec. 13, T. 2 N., R. 4 E.

Ap—0 to 9 inches; very dark grayish brown (2.5Y 3/2) silty clay, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate medium and fine granular; firm; common fine and medium roots; neutral; abrupt smooth boundary.
Bg1—9 to 19 inches; grayish brown (10YR 5/2) silty clay; moderate medium and coarse angular blocky structure; firm; few fine roots; few faint dark grayish brown (10YR 4/2) pressure faces on vertical faces of peds; few faint dark grayish brown (10YR 4/2) krotovinas; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium faint gray (10YR 5/1) iron depletions in the matrix; few fine faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; neutral; clear wavy boundary.
Bg2—19 to 33 inches; gray (10YR 5/1) silty clay; weak medium and coarse prismatic structure parting to moderate medium angular blocky; firm; few fine roots; few pores; common faint gray (10YR 5/1) pressure faces on vertical faces of primary peds; few faint grayish brown (10YR 5/2) coatings in pores; few faint dark grayish brown (10YR 4/2) krotovinas; common fine and medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine faint grayish brown (10YR 5/2) iron depletions in the matrix; few fine faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; neutral; clear wavy boundary.

Bg3—33 to 43 inches; gray (10YR 5/1) silty clay; weak coarse prismatic structure parting to moderate medium angular blocky; firm; few fine roots; common faint gray (10YR 5/1) pressure faces on vertical faces of primary peds; few faint dark grayish brown (10YR 4/2) krotovinas; common coarse prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common fine and medium faint grayish brown (10YR 5/2) iron depletions in the matrix; few fine faint very grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; neutral; clear wavy boundary.

C1—43 to 74 inches; dark yellowish brown (10YR 4/4) silty clay; massive; firm; few distinct gray (10YR 5/1) pressure faces on faces of vertical partings in the upper part; few distinct dark grayish brown (10YR 4/2) krotovinas in the upper part; common medium and coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; common medium distinct light gray (10YR 7/2) masses of calcium carbonate accumulation occurring as concretions in the matrix; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—74 to 80 inches; brown (10YR 4/3) clay; massive; weakly laminated; very firm; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the dark epipedon: 7 to 9 inches
Thickness of the solum: 30 to 55 inches
Depth to carbonates: 30 to 50 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 or 2
Texture—silty clay or silty clay loam

Bg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 2
Texture—silty clay or clay

C or Cg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 6
Texture—typically silty clay or clay; less commonly silty clay loam

Wabasha Series

Depth class: Very deep
Drainage class: Poorly drained and very poorly drained
Permeability: Slow
Parent material: Alluvium
Landform: Flood plains
Position on the landform: Depressions, old stream channels, flat areas
Slope range: 0 to 2 percent
Adjacent soils: Defiance, Flatrock, Shoals

Taxonomic classification: Fine, illitic, nonacid, mesic Mollic Fluvaquents

Typical Pedon

Wabasha silty clay loam, frequently flooded, about 1.5 miles east of Oakwood, in Brown Township, about 2,600 feet north and 2,400 feet west of the southeast corner of sec. 25, T. 2 N., R. 4 E.

Ap—0 to 9 inches; very dark grayish brown (2.5Y 3/2) silty clay loam, brown (10YR 5/3) dry; weak coarse subangular blocky structure parting to moderate fine granular; firm; few medium and common fine roots; neutral; gradual smooth boundary.

Bg1—9 to 12 inches; dark gray (10YR 4/1) silty clay; weak medium subangular blocky structure; firm; few fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium faint grayish brown (10YR 5/2) iron depletions in the matrix; many fine faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; slightly acid; clear wavy boundary.

Bg2—12 to 24 inches; gray (10YR 5/1) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common faint gray (10YR 5/1) coatings on vertical faces of peds; common medium faint gray (10YR 5/1) iron depletions in the matrix; common coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation in the matrix; many fine faint very dark grayish brown (10YR 3/2) masses of iron and manganese accumulation in the matrix; slightly acid; clear wavy boundary.

Bg3—24 to 42 inches; gray (2.5Y 5/1) silty clay; weak medium and coarse subangular blocky structure; firm; common distinct gray (10YR 5/1) coatings on vertical faces of peds; common medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix; few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; common medium and coarse prominent yellowish brown (10YR 5/4)

masses of iron accumulation in the matrix; neutral; gradual wavy boundary.
Bg4—42 to 52 inches; grayish brown (2.5Y 5/2) silty clay; weak coarse subangular blocky structure; firm; common distinct gray (10YR 5/1) coatings on vertical faces of peds; common medium and coarse prominent yellowish brown (10YR 5/4) masses of iron accumulation in the matrix; common medium distinct gray (10YR 5/1) iron depletions in the matrix; slightly alkaline; gradual wavy boundary.
C—52 to 80 inches; yellowish brown (10YR 5/4) silty clay; massive; firm; common medium distinct grayish brown (10YR 5/2) iron depletions in the matrix; slightly effervescent at a depth of 70 inches; slightly alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Thickness of the dark epipedon: 7 to 9 inches
Depth to carbonates: 40 to more than 80 inches

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 3, chroma of 1 or 2
Texture—silty clay loam

Bg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 2
Texture—silty clay or clay

C or Cg horizon:
Color—hue of 10YR to 5Y or N, value of 4 to 6, chroma of 0 to 4
Texture—typically silty clay or clay; less commonly silty clay loam or clay loam

Whitaker Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the solum and moderate or moderately rapid in the substratum
Parent material: Lacustrine deposits
Landform: Lake plains
Position on the landform: Knolls, slight rises
Slope range: 0 to 2 percent
Adjacent soils: Haskins, Mermill

Taxonomic classification: Fine-loamy, mixed, mesic Aeric Endoaqualfs

Typical Pedon

Whitaker loam, 0 to 2 percent slopes, about 1.5 miles south of Harlan, in Milan Township, Allen County, Indiana; $NW^1/_4SE^1/_4NW^1/_4$ of sec. 2, T. 31 N., R. 14 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; slightly acid; abrupt smooth boundary.
E—9 to 13 inches; pale brown (10YR 6/3) loam; weak thick and very thick platy structure parting to moderate fine and medium subangular blocky; friable; few fine and medium distinct yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; few fine and medium faint light brownish gray (10YR 6/2) iron depletions in the matrix; slightly acid; clear smooth boundary.
Bt1—13 to 23 inches; yellowish brown (10YR 5/6) clay loam; moderate medium and coarse angular blocky and subangular blocky structure; firm; common faint yellowish brown (10YR 5/4) clay films on faces of peds; many medium prominent grayish brown (10YR 5/2) iron depletions in the matrix; strongly acid; clear wavy boundary.
Bt2—23 to 32 inches; gray (10YR 6/1) silty clay loam; moderate medium and coarse angular blocky structure; firm; many faint grayish brown (10YR 5/2) clay films on faces of peds; common fine prominent yellowish brown (10YR 5/6) and distinct brown (10YR 5/3) masses of iron accumulation in the matrix; strongly acid; clear wavy boundary.
BC—32 to 44 inches; gray (10YR 6/1) clay loam; weak coarse angular blocky structure; firm; many coarse prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix; slightly acid; clear wavy boundary.
Cg—44 to 60 inches; light gray (10YR 7/2), stratified silt, silt loam, and sand; massive; very friable; strongly effervescent; slightly alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches
Depth to carbonates: 40 to 60 inches

Ap and E horizons:
Color—hue of 10YR, value of 4 to 6, chroma of 2 or 3
Texture—loam
Content of rock fragments—0 to 3 percent

Bt or Btg horizon and BC or BCg horizon:

Color—hue of 7.5YR or 10YR, value of 4 to 6, chroma of 1 to 6

Texture—loam, clay loam, silty clay loam, or sandy clay loam

Content of rock fragments—0 to 3 percent

Cg horizon:

Color—hue of 10YR, value of 5 to 7, chroma of 2

Texture—loam, silt, silt loam, sandy loam, or sand; commonly stratified

Content of rock fragments—0 to 3 percent

Formation of the Soils

This section relates the major factors of soil formation to the soils in Paulding County and describes 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 five major factors—parent material, climate, living organisms, relief, and time.

Parent Material

The material in which a soil formed is called parent material. Most of the parent material in Paulding County was deposited by the last glacier that covered the area thousands of years ago or by meltwater from this glacier. The more recent alluvium deposited by modern streams is another type of parent material in the survey area.

Till was deposited directly beneath glacial ice and underlies most of Paulding County at varying depths. The till contains a variety of particles, ranging in size from clay to boulders. Although most of the material in the till is of local origin, some igneous, metamorphic, and sedimentary rocks were carried from parts of Canada and northern Michigan. Most of the till in the county was subject to modification by water action during various stages of lake formation during and after the Wisconsinan glaciation. Water-modified till primarily occupies the surficial deposits in the west-central, southwestern, and south-central parts of the county. It is also along major streams and rivers in other parts of the county where downcutting into the lacustrine deposits has exposed the till. Till is the parent material of Hoytville, Nappanee, and St. Clair soils.

Clayey and very clayey lacustrine deposits are extensive in Paulding County. These deposits are in a large lake basin formed by the melting glacier. This lake basin occupies most of the northern, eastern, and southeastern parts of the county. The lacustrine soils in the county have a wide range in clay content. Broughton, Paulding, and Roselms soils formed in areas where the clayey deposits contain 60 to 80 percent clay. Fulton, Latty, and Toledo soils formed in areas where the clayey deposits contain 35 to 60 percent clay.

Loamy glaciofluvial sediments were deposited by water or wave action, either along old lake shorelines or as offshore bars. The loamy Belmore and Oshtemo soils formed on beach ridges and offshore bars along old shorelines.

Alluvium is the parent material of the soils on flood plains. These materials accumulate when fresh sediments are added by stream overflow. The composition of the deposits varies widely, depending on the stream gradient and the source of the sediment. Alluvial deposits are stratified because deposition occurs in three basic stages. Gravel and stones are deposited on the streambed; sand is deposited as bars along meandering inner banks; and sand, silt, and clay are deposited on the flood plain during flooding. Defiance, Flatrock, Knoxdale, Landes, Medway, Rossburg, Saranac, Shoals, and Wabasha soils formed in alluvium.

Climate

The climate in Paulding County is uniform enough that it has not greatly contributed to differences among the soils. Climate has favored physical change and chemical weathering of the parent material and the activity of living organisms.

The amount of precipitation varies as a result of microclimate. However, runoff on steep slopes reduces the amount of effective precipitation, and drainage into depressions increases it. Rainfall has been adequate to leach from the upper part of the subsoil any carbonates that were in the parent material of some of the soils on uplands and terraces. Wetting and drying cycles have resulted in the translocation of clay minerals and the formation of soil structure.

The range in temperature has favored both physical change and chemical weathering of the parent material. Freezing and thawing aid the formation of soil structure. Warm temperatures in summer favor 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 thinner than the surface layer of soils that formed under grass. Grasses generally return more organic matter to the soil than trees. 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 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 are more active in alkaline soils.

Two major native plant communities are recognized as the original vegetation of Paulding County. The dominant type, making up approximately 90 percent of the county, is the elm-ash swamp forest. White ash, swamp white oak, pin oak, American sycamore, and eastern cottonwood were the principal species. This community was associated with Hoytville, Nappanee, Latty, Paulding, Roselms, and Toledo soils. In the extreme northern part of the county, a small area of beech forest was associated with better drained areas along the Maumee River. White oak, northern red oak, and sugar maple were the principal species in these better drained areas. This community was associated with Broughton, Flatrock, Knoxdale, and St. Clair soils.

Human activities also affect soil formation. Examples of these activities are cultivation, seeding, artificial drainage, irrigation, and cutting and filling. Accelerated erosion caused by clearing and cultivating the sloping soils, such as Broughton and St. Clair soils, illustrates the impact of human activities on soil formation. Loss of surface soil and compaction of the soil surface affect runoff and plant growth. In large areas, Hoytville, Latty, and Paulding soils have been drained by ditches, surface drains, and subsurface drains. Drainage 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. Relief influences the amount of runoff 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 Broughton and Paulding soils formed in lacustrine deposits. Broughton soils are in higher or more sloping positions than the Paulding soils, and the water table generally is not close to the surface. Broughton soils are moderately well drained. Paulding soils are in low, nearly level areas, and the water table is near or above the surface in the winter. These soils are very poorly drained.

A drainage sequence, or soil catena, is a group of soils that formed in the same parent material but differ in the extent of natural drainage. For example, the moderately well drained Broughton soils, the somewhat poorly drained Roselms soils, and the very poorly drained Paulding soils make up a drainage sequence. All of these soils formed in lacustrine deposits.

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. The youngest soils in Paulding County are those that formed in recent stream deposits, such as Knoxdale and Shoals soils. Younger soils have horizons that are less well defined than those in the older soils.

The glacial deposits in Paulding County are of Wisconsinan age and are geologically young. 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 3 to 6 feet of many of the soils in Paulding 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 Paulding County. Clay has been transferred from the A and E horizons to the B horizon in some of the soils. The E horizon has 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 horizons of some soils. The presence of clay films is an important criterion in soil classification. An example of the alteration process is the reduction and solution of ferrous iron. This process has taken place most dramatically in the very poorly drained soils. Reduction of iron, or gleying, is evident in Hoytville, Latty, and Paulding 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 Paulding County commonly has remained in the horizon where it originated or has settled in an underlying horizon. Iron can be reoxidized and segregated in places to form yellowish brown accumulations that are brighter than the surrounding soil. The alteration of iron causes mottling in soils that are not well drained.

To varying degrees, each of the four soil-forming processes has affected all of the soils in Paulding County. The accumulation of organic matter has been prominent in the formation of Mermill, Millgrove, and Hoytville soils. The removal of carbonates and the transfer of clay have been prominent in the formation of Fulton and Nappanee soils.

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Glossary

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.

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 geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

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.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Bulk density. The mass of a dry soil per unit bulk volume. The bulk volume is determined before drying to a constant weight at 105 degrees C.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

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 milliequivalents 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.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

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.

Clayey. Containing more than 40 percent clay but less than 60 percent clay.

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.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

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.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

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.

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.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

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.”

Contour. An imaginary line on the surface of the earth connecting points of the same elevation.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cropland. Land used primarily for the production of adapted cultivated, close-growing fruit or nut crops for harvest, alone or in association with sod crops.

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.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Cut or fill area. A disturbed area of soil from which material has been excavated or added. Typically one-fourth acre to 2 acres in size. Areas that are more than 2 acres in size are classified and mapped as Udorthents.

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.

Depression. Any relatively sunken part of the earth's surface; especially a low-lying area surrounded by higher ground.

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.

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.

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.

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.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

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.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

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.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

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.

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.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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.

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.

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 pebbles, and extremely gravelly soil material has more than 60 percent pebbles.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

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

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

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:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

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.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

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.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified drift.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Krotovinas. 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.

Lamina. The thinnest recognizable layer (commonly less than 1 centimeter in thickness) of original deposition in a sediment or sedimentary rock, differing from other layers in color, composition, or particle size. Several laminae constitute a bed.

Leaching. The removal of soluble material from soil or other material by percolating water.

Limestone. A sedimentary rock composed of calcium carbonate ($CaCO_3$). There are many impure varieties.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy soil. Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Map unit. A kind of soil, a combination of kinds of soil, or miscellaneous land type or types that can be shown at the scale of mapping for the defined purposes and objectives of the survey. Map units are generally designed to reflect significant differences in use and management.

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.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

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.

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.

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.

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.)

Mulch. Any material, such as straw, sawdust, leaves, plastic film, and loose soil, that is spread upon the surface of the soil to protect the soil and plant roots from the effects of raindrops, soil crusting, freezing, evaporation, and other phenomena.

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.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

No-till farming. A method of planting crops that involves no seedbed preparation other than opening the soil for the purpose of placing the seed at the intended depth. This method usually involves opening a small slit or punching a hole into the soil. There is typically no cultivation during crop production. Chemical weed control is normally used.

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.

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.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, ***hardpan, fragipan, claypan, plowpan,*** and ***traffic pan***.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

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 movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

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.

Pressure face. A smoothed or smeared surface on the surface of a soil aggregate, formed through

rearrangement as a result of shear forces. May persist through successive drying and wetting cycles.

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.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

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.

Relief. The elevations or inequalities of a land surface, considered collectively.

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.

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.

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 soil. Sand or loamy sand.

Sandy spot. An area of soil where the surface layer is sandy (loamy sand or sand) in an area 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 slope. An elongated soil area that has slopes at least two slope classes steeper than the slope class of the surrounding map unit(s).

Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

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.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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 soils. 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.

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:

Nearly level	0 to 2 percent
Gently sloping	2 to 6 percent
Strongly sloping	6 to 12 percent
Moderately steep	12 to 25 percent
Steep	25 to 35 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.

Stream terrace. One of a series of platforms in a

stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

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).

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. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

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 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.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Very clayey. Containing more than 60 percent clay.

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. A somewhat poorly drained to very poorly

drained area that is at least two drainage classes wetter than the named soils in the surrounding map unit.

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 Paulding, Ohio)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	30.9	12.9	21.9	57	-16	4	1.68	0.69	2.51	4	5.6
February---	34.2	15.5	24.8	61	-12	9	1.68	.71	2.60	4	5.5
March------	46.3	25.9	36.1	77	0	80	2.70	1.56	3.70	6	3.2
April------	59.5	36.1	47.8	84	17	266	3.24	2.05	4.32	7	.6
May--------	71.3	46.6	59.0	91	28	564	3.65	2.45	4.75	7	.0
June-------	80.9	56.1	68.5	96	39	839	3.44	1.70	4.94	6	.0
July-------	84.5	59.9	72.2	97	45	980	3.43	2.27	4.50	6	.0
August-----	82.4	57.3	69.8	95	41	910	2.73	1.36	3.93	5	.0
September--	75.8	50.3	63.0	92	32	676	2.96	1.50	4.23	5	.0
October----	63.1	38.3	50.7	84	20	333	2.33	1.05	3.43	5	.0
November---	49.5	30.4	40.0	75	11	112	2.95	1.52	4.19	6	1.6
December---	36.1	19.4	27.7	64	-8	20	2.65	1.37	3.93	6	4.5
Yearly:											
Average---	59.5	37.4	48.5	---	---	---	---	---	---	---	---
Extreme---	---	---	---	98	-18	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,793	33.43	28.32	37.03	67	21.0

* 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 Paulding, 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. 24	May 9	May 18
2 years in 10 later than--	Apr. 19	May 4	May 12
5 years in 10 later than--	Apr. 9	Apr. 23	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 8	Oct. 2	Sept. 20
2 years in 10 earlier than--	Oct. 14	Oct. 7	Sept. 25
5 years in 10 earlier than--	Oct. 26	Oct. 17	Oct. 4

Table 3.--Growing Season

(Recorded in the period 1961-90 at Paulding, 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	166	150	134
8 years in 10	174	157	141
5 years in 10	188	169	154
2 years in 10	202	182	166
1 year in 10	209	189	173

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
BeB	Belmore loam, till substratum, 2 to 6 percent slopes	81	*
BkA	Bixler loamy sand, clayey substratum, 0 to 2 percent slopes	662	0.2
BrB2	Broughton silty clay loam, 2 to 6 percent slopes, eroded	203	*
BrC2	Broughton silty clay loam, 6 to 12 percent slopes, eroded	246	*
BrD2	Broughton silty clay loam, 12 to 18 percent slopes, eroded	654	0.2
BrE2	Broughton silty clay loam, 18 to 35 percent slopes, eroded	665	0.2
BsC3	Broughton silty clay, 6 to 12 percent slopes, severely eroded	665	0.2
BsD3	Broughton silty clay, 12 to 18 percent slopes, severely eroded	578	0.2
Db	Defiance silty clay loam, occasionally flooded	1,065	0.4
Dc	Defiance silty clay loam, frequently flooded	694	0.3
Fb	Flatrock silt loam, occasionally flooded	993	0.4
Fc	Flatrock silt loam, frequently flooded	678	0.3
FtA	Fulton loam, 0 to 2 percent slopes	1,233	0.5
FuA	Fulton silty clay loam, 0 to 2 percent slopes	1,469	0.5
FuB2	Fulton silty clay loam, 2 to 6 percent slopes, eroded	221	*
FxA	Fulton silty clay loam, loamy substratum, 0 to 2 percent slopes	1,556	0.6
FxB	Fulton silty clay loam, loamy substratum, 2 to 6 percent slopes	227	*
Gr	Granby loamy sand, clayey substratum	256	*
HaA	Haskins loamy sand, 0 to 2 percent slopes	1,803	0.7
HkA	Haskins loam, 0 to 2 percent slopes	1,321	0.5
HkB	Haskins loam, 2 to 6 percent slopes	156	*
Hs	Hoytville silty clay loam	5,289	2.0
Ht	Hoytville silty clay	41,671	15.5
Kn	Knoxdale silt loam, occasionally flooded	610	0.2
La	Landes loam, occasionally flooded	220	*
Lb	Latty silty clay loam	2,809	1.0
Lc	Latty silty clay	62,040	23.1
LtA	Lucas silt loam, loamy substratum, 0 to 2 percent slopes	630	0.2
LuB2	Lucas silty clay loam, loamy substratum, 2 to 6 percent slopes, eroded	387	0.1
LuC2	Lucas silty clay loam, loamy substratum, 6 to 12 percent slopes, eroded	225	*
Md	Medway silt loam, occasionally flooded	665	0.2
Me	Mermill loam	1,024	0.4
Mg	Millgrove loam, till substratum	66	*
NnA	Nappanee loam, 0 to 2 percent slopes	3,698	1.4
NpA	Nappanee silty clay loam, 0 to 2 percent slopes	17,199	6.4
NpB	Nappanee silty clay loam, 2 to 6 percent slopes	642	0.2
NpB2	Nappanee silty clay loam, 2 to 6 percent slopes, eroded	1,373	0.5
OsB	Oshtemo sandy loam, till substratum, 2 to 6 percent slopes	80	*
OtB	Ottokee loamy sand, 0 to 6 percent slopes	185	*
Pc	Paulding clay	69,741	26.0
Pt	Pits, quarry	392	0.1
RkA	Rimer loamy sand, 0 to 2 percent slopes	897	0.3
RkB	Rimer loamy sand, 2 to 6 percent slopes	262	*
RmA	Rimer-Fulton complex, 0 to 2 percent slopes	603	0.2
RnA	Roselms loam, 0 to 2 percent slopes	1,001	0.4
RoA	Roselms silty clay loam, 0 to 2 percent slopes	13,088	4.9
RoB	Roselms silty clay loam, 2 to 6 percent slopes	731	0.3
RpA	Roselms silty clay, 0 to 2 percent slopes	3,574	1.3
RpB2	Roselms silty clay, 2 to 6 percent slopes, eroded	957	0.4
Rt	Rossburg silt loam, occasionally flooded	1,111	0.4
Sb	Saranac silty clay loam, occasionally flooded	4,117	1.5
Sh	Shoals silt loam, occasionally flooded	778	0.3
Sk	Shoals silt loam, frequently flooded	226	*
StB2	St. Clair silty clay loam, 2 to 6 percent slopes, eroded	184	*
StC2	St. Clair silty clay loam, 6 to 12 percent slopes, eroded	452	0.2
StD2	St. Clair silty clay loam, 12 to 18 percent slopes, eroded	415	0.2
StE2	St. Clair silty clay loam, 18 to 35 percent slopes, eroded	715	0.3
SuC3	St. Clair silty clay, 6 to 12 percent slopes, severely eroded	324	0.1
SuE3	St. Clair silty clay, 12 to 25 percent slopes, severely eroded	422	0.2
TeA	Tedrow loamy sand, 0 to 3 percent slopes	310	0.1
Tn	Toledo silty clay loam	3,213	1.2
To	Toledo silty clay	3,691	1.4

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
Uc	Udorthents, clayey, hilly	1,207	0.5
W	Water	2,268	0.8
Wb	Wabasha silty clay loam, frequently flooded	3,175	1.2
WhA	Whitaker loam, 0 to 2 percent slopes	7	*
	Total	268,100	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops

(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	Oats	Orchardgrass-red clover hay
		Bu	Bu	Bu	Bu	Tons
BeB--- Belmore	2e	100	32	40	75	4.0
BkA--- Bixler	2w	105	38	45	80	4.0
BrB2--- Broughton	3e	75	28	30	55	3.2
BrC2--- Broughton	4e	70	22	28	50	3.0
BrD2--- Broughton	6e	---	---	---	---	2.8
BrE2--- Broughton	7e	---	---	---	---	2.5
BsC3--- Broughton	6e	---	---	---	---	2.5
BsD3--- Broughton	7e	---	---	---	---	2.3
Db--- Defiance	3w	105	38	42	70	4.0
Dc--- Defiance	3w	105	38	---	---	---
Fb--- Flatrock	2w	115	42	45	74	4.8
Fc--- Flatrock	2w	115	42	---	---	---
FtA--- Fulton	3w	105	38	42	75	4.0
FuA--- Fulton	3w	105	38	42	75	4.0
FuB2--- Fulton	3e	100	34	40	75	4.0
FxA--- Fulton	3w	108	40	45	75	4.0
FxB--- Fulton	3e	100	35	42	75	4.0
Gr--- Granby	4w	115	41	44	70	4.4
HaA--- Haskins	2w	113	41	45	82	4.4

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-red clover hay
		Bu	Bu	Bu	Bu	Tons
HkA---------- Haskins	2w	113	42	46	82	4.4
HkB---------- Haskins	2e	110	41	45	82	4.2
Hs---------- Hoytville	2w	130	46	52	80	5.2
Ht---------- Hoytville	2w	125	45	50	78	5.0
Kn---------- Knoxdale	2w	120	42	45	74	5.0
La---------- Landes	2w	100	36	42	75	3.6
Lb---------- Latty	3w	120	44	46	80	5.2
Lc---------- Latty	3w	118	42	45	78	5.0
LtA---------- Lucas	1	110	40	44	80	4.2
LuB2---------- Lucas	3e	100	32	40	75	3.8
LuC2---------- Lucas	4e	90	32	40	70	3.6
Md---------- Medway	2w	125	45	50	78	5.5
Me---------- Mermill	2w	135	48	52	85	5.4
Mg---------- Millgrove	2w	140	50	55	93	5.6
NnA---------- Nappanee	3w	108	40	48	80	4.2
NpA---------- Nappanee	3w	108	40	48	80	4.2
NpB---------- Nappanee	3e	105	36	42	75	4.2
NpB2---------- Nappanee	3e	100	32	40	75	4.2
OsB---------- Oshtemo	3s	95	32	40	75	3.6
OtB---------- Ottokee	3s	95	34	40	70	3.8
Pc---------- Paulding	3w	105	38	40	72	4.0

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-red clover hay
		Bu	Bu	Bu	Bu	Tons
Pt. Pits, quarry						
RkA---------- Rimer	2w	105	38	45	80	4.0
RkB---------- Rimer	2e	100	35	42	75	3.8
RmA---------- Rimer-Fulton	2w	106	39	45	78	4.0
RnA---------- Roselms	3w	90	34	35	65	3.5
RoA---------- Roselms	3w	90	34	35	65	3.5
RoB---------- Roselms	3e	80	30	30	55	3.2
RpA---------- Roselms	3w	85	30	35	65	3.5
RpB2---------- Roselms	3e	75	28	30	55	3.2
Rt---------- Rossburg	2w	125	45	50	78	5.2
Sb---------- Saranac	3w	115	42	44	80	4.6
Sh---------- Shoals	2w	115	42	45	74	4.8
Sk---------- Shoals	2w	115	42	---	---	---
StB2---------- St. Clair	3e	80	30	35	55	3.4
StC2---------- St. Clair	4e	75	25	30	55	3.2
StD2---------- St. Clair	6e	---	---	---	---	3.0
StE2---------- St. Clair	7e	---	---	---	---	2.7
SuC3---------- St. Clair	6e	---	---	---	---	2.7
SuE3---------- St. Clair	7e	---	---	---	---	2.3
TeA---------- Tedrow	3s	95	32	40	70	3.8

Table 5.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-red clover hay
		Bu	Bu	Bu	Bu	Tons
Tn---------- Toledo	3w	120	44	48	80	5.0
To---------- Toledo	3w	115	41	45	80	4.8
Uc. Udorthents						
Wb---------- Wabasha	3w	105	40	---	---	---
WhA---------- Whitaker	2w	115	42	48	85	4.5

Table 6.--Crop Yield Index

(See text for an explanation of the ratings in this table. An asterisk indicates that the map unit is not rated for crop production but is rated only on the basis of estimated yields for orchardgrass-red clover hay. Absence of an entry indicates that the map unit is not used for any type of crop production)

Map symbol and soil name	Yield index
BeB:	
Belmore	70
BkA:	
Bixler	77
BrB2:	
Broughton	54
BrC2:	
Broughton	49
BrD2:	
Broughton	2.8*
BrE2:	
Broughton	2.5*
BsC3:	
Broughton	2.5*
BsD3:	
Broughton	2.3*
Db:	
Defiance	76
Dc:	
Defiance	58
Fb:	
Flatrock	82
Fc:	
Flatrock	64
FtA:	
Fulton	76
FuA:	
Fulton	76
FuB2:	
Fulton	71
FxA:	
Fulton	79
FxB:	
Fulton	72
Gr:	
Granby	82
HaA:	
Haskins	81

Table 6.--Crop Yield Index--Continued

Map symbol and soil name	Yield index
HkA: Haskins	82
HkB: Haskins	80
Hs: Hoytville	93
Ht: Hoytville	90
Kn: Knoxdale	84
La: Landes	73
Lb: Latty	86
Lc: Latty	84
LtA: Lucas	79
LuB2: Lucas	70
LuC2: Lucas	66
Md: Medway	90
Me: Mermill	96
Mg: Millgrove	100
NnA: Nappanee	80
NpA: Nappanee	80
NpB: Nappanee	75
NpB2: Nappanee	70
OsB: Oshtemo	68
OtB: Ottokee	69
Pc: Paulding	75

Table 6.--Crop Yield Index--Continued

Map symbol and soil name	Yield index
Pt:	
Pits, quarry.	
RkA:	
Rimer	77
RkB:	
Rimer	72
RmA:	
Rimer-Fulton	77
RnA:	
Roselms	65
RoA:	
Roselms	65
RoB:	
Roselms	57
RpA:	
Roselms	61
RpB2:	
Roselms	54
Rt:	
Rossburg	90
Sb:	
Saranac	82
Sh:	
Shoals	82
Sk:	
Shoals	64
StB2:	
St. Clair	59
StC2:	
St. Clair	53
StD2:	
St. Clair	3.0*
StE2:	
St. Clair	2.7*
SuC3:	
St. Clair	2.7*
SuE3:	
St. Clair	2.3*
TeA:	
Tedrow	68
Tn:	
Toledo	86

Table 6.--Crop Yield Index--Continued

Map symbol and soil name	Yield index
To:	
Toledo	82
Uc:	
Udorthents.	
Wb:	
Wabasha	59
WhA:	
Whitaker	84

Table 7.--Main Cropland Limitations and Hazards

(See text for a description of the limitations and hazards listed in this table)

Map symbol and soil name	Cropland limitations or hazards
BeB:	
Belmore	High potential for ground-water pollution
	Excessive permeability
	Limited organic matter content
BkA:	
Bixler	High potential for ground-water pollution
	Excessive permeability
	Seasonal high water table
	Limited organic matter content
	Frost heave
	Wind erosion
BrB2:	
Broughton	Easily eroded
	Part of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
BrC2:	
Broughton	Easily eroded
	Part of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
BrD2:	
Broughton	Easily eroded
	Slope
	Part of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
BrE2:	
Broughton	Easily eroded
	Slope
	Part of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
BsC3:	
Broughton	Easily eroded
	Most of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Poor tilth
	Limited organic matter content
BsD3:	
Broughton	Easily eroded
	Slope
	Most of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Poor tilth
	Limited organic matter content
Db:	
Defiance	Occasional flooding
	High potential for ground-water pollution
	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
	Frost heave
Dc:	
Defiance	Frequent flooding
	High potential for ground-water pollution
	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
	Frost heave
Fb:	
Flatrock	Occasional flooding
	High potential for ground-water pollution
	Seasonal high water table
	Surface compaction
	Surface crusting
	Limited organic matter content
Fc:	
Flatrock	Frequent flooding
	High potential for ground-water pollution
	Seasonal high water table
	Surface compaction
	Surface crusting
	Limited organic matter content
FtA:	
Fulton	High clay content in the subsoil and substratum
	Seasonal high water table
	Limited organic matter content
	Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
FuA:	
Fulton	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
	Frost heave
FuB2:	
Fulton	Easily eroded
	Part of surface layer removed
	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
	Frost heave
FxA:	
Fulton	High clay content in the subsoil
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
	Frost heave
FxB:	
Fulton	Easily eroded
	High clay content in the subsoil
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
	Frost heave
Gr:	
Granby	Ponding
	High potential for ground-water pollution
	Limited available water capacity
	Excessive permeability
	Wind erosion
HaA:	
Haskins	Root-restricting layer
	Seasonal high water table
	Limited organic matter content
	Frost heave
	Wind erosion
HkA:	
Haskins	Root-restricting layer
	Seasonal high water table
	Limited organic matter content
	Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
HkB:	
Haskins	Easily eroded
	Root-restricting layer
	Seasonal high water table
	Limited organic matter content
	Frost heave
Hs:	
Hoytville	Ponding
	High clay content in the subsoil and substratum
	Surface compaction
	Fair tilth
	Frost heave
Ht:	
Hoytville	Ponding
	High clay content in the subsoil and substratum
	Surface compaction
	Poor tilth
	Frost heave
Kn:	
Knoxdale	Occasional flooding
	Surface compaction
	Surface crusting
	Limited organic matter content
La:	
Landes	Occasional flooding
	High potential for ground-water pollution
	Easily eroded
	Excessive permeability
	Limited organic matter content
Lb:	
Latty	Ponding
	High clay content in the subsoil and substratum
	Surface compaction
	Poor tilth
	Frost heave
Lc:	
Latty	Ponding
	High clay content in the subsoil and substratum
	Surface compaction
	Poor tilth
	Frost heave
LtA:	
Lucas	High clay content in the subsoil
	Surface compaction
	Surface crusting
	Limited organic matter content
LuB2:	
Lucas	Easily eroded
	Part of surface layer removed
	High clay content in the subsoil
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
LuC2:	
Lucas	Easily eroded
	Part of surface layer removed
	High clay content in the subsoil
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
Md:	
Medway	Occasional flooding
	High potential for ground-water pollution
	Seasonal high water table
	Surface compaction
	Frost heave
Me:	
Mermill	Ponding
	Frost heave
Mg:	
Millgrove	Ponding
	Frost heave
NnA:	
Nappanee	High clay content in the subsoil and substratum
	Seasonal high water table
	Limited organic matter content
NpA:	
Nappanee	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
NpB:	
Nappanee	Easily eroded
	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
NpB2:	
Nappanee	Easily eroded
	Part of surface layer removed
	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
OsB:	
Oshtemo	Excessive permeability
	Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
OtB:	
Ottokee	High potential for ground-water pollution Limited available water capacity Excessive permeability Limited organic matter content Wind erosion
Pc:	
Paulding	Ponding Limited available water capacity Very high clay content in the subsoil and substratum Poor tilth
Pt:	
Pits, quarry.	
RkA:	
Rimer	Root-restricting layer Limited available water capacity Excessive permeability Seasonal high water table Limited organic matter content Frost heave Wind erosion
RkB:	
Rimer	Root-restricting layer Limited available water capacity Excessive permeability Seasonal high water table Limited organic matter content Frost heave Wind erosion
RmA:	
Rimer	Root-restricting layer Excessive permeability Seasonal high water table Limited organic matter content Frost heave Wind erosion
Fulton	High clay content in the subsoil and substratum Seasonal high water table Limited organic matter content
RnA:	
Roselms	Limited available water capacity Very high clay content in the subsoil and substratum Seasonal high water table Limited organic matter content
RoA:	
Roselms	Limited available water capacity Very high clay content in the subsoil and substratum Seasonal high water table Surface compaction Fair tilth Surface crusting Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
RoB:	
Roselms	Easily eroded
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
RpA:	
Roselms	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Poor tilth
	Limited organic matter content
RpB2:	
Roselms	Part of surface layer removed
	Limited available water capacity
	Very high clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Poor tilth
	Limited organic matter content
Rt:	
Rossburg	Occasional flooding
	High potential for ground-water pollution
	Surface compaction
Sb:	
Saranac	Occasional flooding
	High potential for ground-water pollution
	High clay content in the subsoil and substratum
	Seasonal high water table
	Surface compaction
	Fair tilth
	Frost heave
Sh:	
Shoals	Occasional flooding
	High potential for ground-water pollution
	Seasonal high water table
	Surface compaction
	Frost heave
Sk:	
Shoals	Frequent flooding
	High potential for ground-water pollution
	Seasonal high water table
	Surface compaction
	Frost heave
StB2:	
St. Clair	Easily eroded
	Part of surface layer removed
	High clay content in the subsoil and substratum
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
StC2:	
St. Clair	Easily eroded
	Part of surface layer removed
	High clay content in the subsoil and substratum
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
StD2:	
St. Clair	Easily eroded
	Slope
	Part of surface layer removed
	High clay content in the subsoil and substratum
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
StE2:	
St. Clair	Easily eroded
	Slope
	Part of surface layer removed
	High clay content in the subsoil and substratum
	Surface compaction
	Fair tilth
	Surface crusting
	Limited organic matter content
SuC3:	
St. Clair	Easily eroded
	Most of surface layer removed
	High clay content in the subsoil and substratum
	Surface compaction
	Poor tilth
	Limited organic matter content
SuE3:	
St. Clair	Easily eroded
	Slope
	Most of surface layer removed
	High clay content in the subsoil and substratum
	Surface compaction
	Poor tilth
	Limited organic matter content
TeA:	
Tedrow	High potential for ground-water pollution
	Limited available water capacity
	Excessive permeability
	Seasonal high water table
	Limited organic matter content
	Wind erosion
Tn:	
Toledo	Ponding
	High clay content in the subsoil and substratum
	Surface compaction
	Fair tilth
	Frost heave

Table 7.--Main Cropland Limitations and Hazards--Continued

Map symbol and soil name	Cropland limitations or hazards
To:	
Toledo	Ponding High clay content in the subsoil and substratum Surface compaction Poor tilth Frost heave
Uc:	
Udorthents.	
Wb:	
Wabasha	Frequent flooding High potential for ground-water pollution High clay content in the subsoil and substratum Seasonal high water table Surface compaction Poor tilth Frost heave
WhA:	
Whitaker	High potential for ground-water pollution Seasonal high water table 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 problem (s)
		Acres	Acres	Acres
1	630	---	---	---
2	59,123	499	58,624	---
3	199,466	4,925	193,966	575
4	1,179	923	256	---
5	---	---	---	---
6	2,058	2,058	---	---
7	2,380	2,380	---	---
8	---	---	---	---

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
BeB	Belmore loam, till substratum, 2 to 6 percent slopes
BkA	Bixler loamy sand, clayey substratum, 0 to 2 percent slopes (where drained)
Db	Defiance silty clay loam, occasionally flooded (where drained)
Dc	Defiance silty clay loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
Fb	Flatrock silt loam, occasionally flooded
Fc	Flatrock silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
FtA	Fulton loam, 0 to 2 percent slopes (where drained)
FuA	Fulton silty clay loam, 0 to 2 percent slopes (where drained)
FuB2	Fulton silty clay loam, 2 to 6 percent slopes, eroded (where drained)
FxA	Fulton silty clay loam, loamy substratum, 0 to 2 percent slopes (where drained)
FxB	Fulton silty clay loam, loamy substratum, 2 to 6 percent slopes (where drained)
HaA	Haskins loamy sand, 0 to 2 percent slopes (where drained)
HkA	Haskins loam, 0 to 2 percent slopes (where drained)
HkB	Haskins loam, 2 to 6 percent slopes (where drained)
Hs	Hoytville silty clay loam (where drained)
Ht	Hoytville silty clay (where drained)
Kn	Knoxdale silt loam, occasionally flooded
La	Landes loam, occasionally flooded
Lb	Latty silty clay loam (where drained)
Lc	Latty silty clay (where drained)
LtA	Lucas silt loam, loamy substratum, 0 to 2 percent slopes
LuB2	Lucas silty clay loam, loamy substratum, 2 to 6 percent slopes, eroded
Md	Medway silt loam, occasionally flooded
Me	Mermill loam (where drained)
Mg	Millgrove loam, till substratum (where drained)
NnA	Nappanee loam, 0 to 2 percent slopes (where drained)
NpA	Nappanee silty clay loam, 0 to 2 percent slopes (where drained)
NpB	Nappanee silty clay loam, 2 to 6 percent slopes (where drained)
NpB2	Nappanee silty clay loam, 2 to 6 percent slopes, eroded (where drained)
OsB	Oshtemo sandy loam, till substratum, 2 to 6 percent slopes
RkA	Rimer loamy sand, 0 to 2 percent slopes (where drained)
RkB	Rimer loamy sand, 2 to 6 percent slopes (where drained)
RmA	Rimer-Fulton complex, 0 to 2 percent slopes (where drained)
Rt	Rossburg silt loam, occasionally flooded
Sb	Saranac silty clay loam, occasionally flooded (where drained)
Sh	Shoals silt loam, occasionally flooded (where drained)
Sk	Shoals silt loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
StB2	St. Clair silty clay loam, 2 to 6 percent slopes, eroded
Tn	Toledo silty clay loam (where drained)
To	Toledo silty clay (where drained)
Wb	Wabasha silty clay loam, frequently flooded (where drained and protected from flooding or not frequently flooded during the growing season)
WhA	Whitaker loam, 0 to 2 percent slopes (where drained)

Table 10.--Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
BeB:										
Belmore--------	4A	Slight	Slight	Slight	Slight	Severe	Black cherry--------	---	---	Black cherry,
							Black walnut--------	---	---	black walnut,
							Northern red oak----	80	57	eastern white
							Sugar maple---------	---	---	pine, northern
							Tuliptree-----------	---	---	red oak, sugar
							White ash-----------	---	---	maple,
							White oak-----------	---	---	tuliptree,
										white ash,
										white oak.
BkA:										
Bixler---------	4S	Slight	Slight	Moderate	Slight	Moderate	Black oak-----------	---	---	American
							Bur oak-------------	---	---	sycamore,
							Green ash-----------	---	---	Norway spruce,
							Northern red oak----	80	57	black cherry,
							Quaking aspen-------	---	---	black oak,
							Red maple-----------	---	---	eastern
							Slippery elm--------	---	---	cottonwood,
										eastern
										redcedar,
										green ash,
										northern red
										oak, pin oak,
										red maple,
										silver maple,
										swamp white
										oak,
										tuliptree,
										white ash,
										white oak.
BrB2:										
Broughton------	4C	Slight	Moderate	Severe	Severe	Moderate	Black cherry--------	---	---	Austrian pine,
							Pin oak-------------	70	57	black oak,
							Red maple-----------	---	---	green ash, pin
							Slippery elm--------	---	---	oak, red
							White ash-----------	---	---	maple,
							White oak-----------	55	43	tuliptree,
										white ash,
										white oak.
BrC2:										
Broughton------	4C	Slight	Moderate	Severe	Severe	Moderate	Black cherry--------	---	---	Austrian pine,
							Pin oak-------------	70	57	black oak,
							Red maple-----------	---	---	green ash, pin
							Slippery elm--------	---	---	oak, red
							White ash-----------	---	---	maple,
							White oak-----------	55	43	tuliptree,
										white ash,
										white oak.

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
BrD2:										
Broughton------	4R	Moderate	Moderate	Severe	Severe	Moderate	Black cherry--------	---	---	Norway spruce,
							Pin oak----------	70	57	black cherry,
							Red maple----------	---	---	black walnut,
							Slippery elm--------	---	---	eastern white
							White ash----------	---	---	pine, green
							White oak----------	55	43	ash, northern
										red oak,
										tuliptree,
										white oak.
BrE2:										
Broughton------	4R	Moderate	Moderate	Severe	Severe	Moderate	Black cherry--------	---	---	Norway spruce,
							Pin oak----------	70	57	black cherry,
							Red maple----------	---	---	black walnut,
							Slippery elm--------	---	---	eastern white
							White ash----------	---	---	pine, green
							White oak----------	55	43	ash, northern
										red oak,
										tuliptree,
										white oak.
BsC3:										
Broughton------	4C	Slight	Moderate	Severe	Severe	Moderate	Black cherry--------	---	---	Austrian pine,
							Pin oak----------	70	57	black oak,
							Red maple----------	---	---	green ash, pin
							Slippery elm--------	---	---	oak, red
							White ash----------	---	---	maple,
							White oak----------	55	43	tuliptree,
										white ash,
										white oak.
BsD3:										
Broughton------	4R	Moderate	Moderate	Severe	Severe	Moderate	Black cherry--------	---	---	Norway spruce,
							Pin oak----------	70	57	black cherry,
							Red maple----------	---	---	black walnut,
							Slippery elm--------	---	---	eastern white
							White ash----------	---	---	pine, green
							White oak----------	55	43	ash, northern
										red oak,
										tuliptree,
										white oak.
Db:										
Defiance-------	3C	Slight	Moderate	Moderate	Severe	Severe	Black cherry--------	---	---	American
							Red maple----------	---	---	sycamore,
							Slippery elm--------	---	---	black oak,
							White ash----------	---	---	eastern
							White oak----------	65	43	cottonwood,
										eastern
										redcedar,
										green ash,
										northern red
										oak, pin oak,
										red maple,
										silver maple,
										swamp white
										oak.

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Dc:										
Defiance	3C	Slight	Moderate	Moderate	Severe	Severe	Black cherry Red maple Slippery elm White ash White oak	--- --- --- --- 65	--- --- --- --- 43	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
Fb:										
Flatrock	4A	Slight	Slight	Slight	Slight	Severe	Black cherry Black walnut Northern red oak Tuliptree White oak	--- --- 80 --- ---	--- --- 57 --- ---	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak.
Fc:										
Flatrock	4A	Slight	Moderate	Slight	Slight	Severe	Black cherry Black walnut Northern red oak Tuliptree White oak	--- --- 80 --- ---	--- --- 57 --- ---	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak.
FtA:										
Fulton	4C	Slight	Slight	Severe	Severe	Severe	American beech Black cherry Pin oak Red maple Slippery elm White ash White oak	--- --- 80 --- --- --- ---	--- --- 57 --- --- --- ---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
FuA:										
Fulton	4C	Slight	Moderate	Severe	Severe	Severe	American beech	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Black cherry	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
FuB2:										
Fulton	4C	Slight	Moderate	Severe	Severe	Severe	American beech	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Black cherry	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
FxA:										
Fulton	4C	Slight	Moderate	Severe	Severe	Severe	American beech	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Black cherry	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
FxB:										
Fulton	4C	Slight	Moderate	Severe	Severe	Severe	American beech	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Black cherry	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
Gr:										
Granby	4W	Slight	Moderate	Severe	Severe	Severe	Eastern white pine	75	172	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Pin oak	70	57	
							Quaking aspen	70	86	
							Red maple	68	43	
							Silver maple	82	29	
HaA:										
Haskins	4A	Slight	Slight	Severe	Slight	Moderate	Black cherry	---	---	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak.
							Northern red oak	80	57	
							Pin oak	90	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	75	57	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
HkA:										
Haskins	4A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak.
							Northern red oak	80	57	
							Pin oak	90	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	75	57	
HkB:										
Haskins	4A	Slight	Slight	Moderate	Slight	Severe	Black cherry	---	---	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak.
							Northern red oak	80	57	
							Pin oak	90	72	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	75	57	
Hs:										
Hoytville	4W	Slight	Moderate	Severe	Severe	Severe	Black cherry	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Northern red oak	72	57	
							Pin oak	76	57	
							Red maple	---	---	
							White ash	77	43	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Ht:										
Hoytville------	4W	Slight	Moderate	Severe	Severe	Severe	Black cherry-------- Eastern cottonwood-- Green ash---------- Northern red oak---- Pin oak------------- Red maple----------- White ash-----------	--- --- --- 72 76 --- 77	--- --- --- 57 57 --- 43	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
Kn:										
Knoxdale-------	5A	Slight	Slight	Slight	Slight	Severe	Black cherry-------- Black walnut-------- Tuliptree---------- White ash---------- White oak----------	--- --- 100 --- 90	--- --- 114 --- 72	Black cherry, black walnut,, eastern white pine, northern red oak, sugar maple, tuliptree, white ash, white oak.
La:										
Landes---------	7A	Slight	Slight	Slight	Slight	Severe	American sycamore--- Eastern cottonwood-- Green ash---------- Sweetgum---------- Tuliptree----------	--- 105 --- --- 95	--- 143 --- --- 100	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak.
Lb:										
Latty----------	4W	Slight	Moderate	Severe	Severe	Severe	Black cherry-------- Eastern cottonwood-- Green ash---------- Pin oak------------- Red maple----------- Swamp white oak-----	--- --- --- 70 --- 70	--- --- --- 57 --- ---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Lc:										
Latty	4W	Slight	Moderate	Severe	Severe	Severe	Black cherry	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	70	57	
							Red maple	---	---	
							Swamp white oak	70	---	
LtA:										
Lucas	4C	Slight	Slight	Severe	Severe	Moderate	Black cherry	---	---	Austrian pine, black oak, green ash, pin oak, red maple, tuliptree, white ash, white oak.
							Northern red oak	70	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
LuB2:										
Lucas	4C	Slight	Moderate	Severe	Severe	Moderate	Black cherry	---	---	Austrian pine, black oak, green ash, pin oak, red maple, tuliptree, white ash, white oak.
							Northern red oak	70	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
LuC2:										
Lucas	4C	Slight	Moderate	Severe	Severe	Moderate	Black cherry	---	---	Austrian pine, black oak, green ash, pin oak, red maple, tuliptree, white ash, white oak.
							Northern red oak	70	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
Md:										
Medway	5A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, pin oak, tuliptree, white ash, white oak.
							Black walnut	---	---	
							Northern red oak	86	72	
							Sugar maple	---	---	
							Tuliptree	96	100	
							White ash	---	---	
							White oak	---	---	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Me:										
Mermill	5W	Slight	Moderate	Severe	Severe	Severe	Eastern cottonwood	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Green ash	---	---	
							Pin oak	90	72	
							Red maple	---	---	
							Swamp white oak	90	72	
Mg:										
Millgrove	5W	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Green ash	---	---	
							Pin oak	86	72	
							Red maple	---	---	
							Swamp white oak	85	72	
NnA:										
Nappanee	5C	Slight	Slight	Severe	Severe	Severe	American sycamore	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Pin oak	85	72	
							Sweetgum	80	86	
							White oak	75	72	
NpA:										
Nappanee	5C	Slight	Moderate	Severe	Severe	Severe	American sycamore	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Pin oak	85	72	
							Sweetgum	80	86	
							White oak	75	72	

See footnote at end of table.

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*	Suggested trees to plant
NpB:										
Nappanee	5C	Slight	Moderate	Severe	Severe	Severe	American sycamore	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Pin oak	85	72	
							Sweetgum	80	86	
							White oak	75	72	
NpB2:										
Nappanee	5C	Slight	Moderate	Severe	Severe	Severe	American sycamore	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Pin oak	85	72	
							Sweetgum	80	86	
							White oak	75	72	
OsB:										
Oshtemo	4A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	Black cherry, black walnut, eastern white pine, northern red oak, sugar maple, tuliptree, white ash, white oak.
							Black walnut	---	---	
							Northern red oak	70	57	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	---	---	
OtB:										
Ottokee	4S	Slight	Slight	Severe	Slight	Moderate	Bur oak	---	---	Black oak, black walnut, eastern white pine, northern red oak, white ash, white oak.
							Green ash	---	---	
							Northern red oak	70	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	65	43	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Pc:										
Paulding	4W	Slight	Moderate	Severe	Severe	Severe	Black cherry	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Eastern cottonwood	---	---	
							Green ash	---	---	
							Pin oak	76	57	
							Red maple	---	---	
							Swamp white oak	65	43	
RkA:										
Rimer	4A	Slight	Slight	Severe	Slight	Moderate	Black oak	---	---	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak.
							Bur oak	---	---	
							Green ash	---	---	
							Northern red oak	80	57	
							Quaking aspen	---	---	
							Red maple	---	---	
							Slippery elm	---	---	
							White oak	75	57	
RkB:										
Rimer	4A	Slight	Slight	Severe	Slight	Moderate	Black oak	---	---	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak.
							Bur oak	---	---	
							Green ash	---	---	
							Northern red oak	80	57	
							Quaking aspen	---	---	
							Red maple	---	---	
							Slippery elm	---	---	
							White oak	75	57	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
RmA:										
Rimer	4A	Slight	Slight	Severe	Slight	Moderate	Black oak	---	---	American sycamore, Norway spruce, black cherry, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak, tuliptree, white ash, white oak.
							Bur oak	---	---	
							Green ash	---	---	
							Northern red oak	80	57	
							Quaking aspen	---	---	
							Red maple	---	---	
							Slippery elm	---	---	
							White oak	75	57	
Fulton	4C	Slight	Slight	Severe	Severe	Severe	American beech	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Black cherry	---	---	
							Pin oak	80	57	
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	---	---	
RnA:										
Roselms	3C	Slight	Slight	Severe	Severe	Moderate	Black cherry	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	60	43	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
RoA:										
Roselms	3C	Slight	Moderate	Severe	Severe	Moderate	Black cherry	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	60	43	
RoB:										
Roselms	3C	Slight	Moderate	Severe	Severe	Moderate	Black cherry	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	60	43	
RpA:										
Roselms	3C	Slight	Moderate	Severe	Severe	Moderate	Black cherry	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	60	43	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
RpB2:										
Roselms	3C	Slight	Moderate	Severe	Severe	Moderate	Black cherry	---	---	American sycamore, black oak, eastern cottonwood, eastern redcedar, green ash, northern red oak, pin oak, red maple, silver maple, swamp white oak.
							Red maple	---	---	
							Slippery elm	---	---	
							White ash	---	---	
							White oak	60	43	
Rt:										
Rossburg	5A	Slight	Slight	Slight	Slight	Severe	Black cherry	---	---	Black cherry, black walnut, eastern white pine, northern red oak, sugar maple, tuliptree, white ash, white oak.
							Black walnut	---	---	
							Northern red oak	---	---	
							Sugar maple	---	---	
							Tuliptree	---	---	
							White ash	---	---	
							White oak	90	72	
Sb:										
Saranac	5W	Slight	Severe	Severe	Moderate	Severe	Bur oak	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Pin oak	85	72	
							Red maple	---	---	
							Sweetgum	---	---	
							White ash	---	---	
Sh:										
Shoals	5W	Slight	Moderate	Moderate	Moderate	Severe	Virginia pine	90	129	American sycamore, eastern cottonwood, pin oak, red maple, swamp white oak, sweetgum, tuliptree.
							Eastern cottonwood	---	---	
							Pin oak	90	72	
							Sweetgum	86	100	
							Tuliptree	90	86	
							White ash	---	---	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Sk:										
Shoals	5W	Slight	Moderate	Moderate	Moderate	Severe	Virginia pine	90	129	American sycamore, eastern cottonwood, pin oak, sweetgum, tuliptree, pin oak, red maple, swamp white oak, sweetgum, tuliptree.
							Eastern cottonwood	---	---	
							Pin oak	90	72	
							Sweetgum	86	100	
							Tuliptree	90	86	
							White ash	---	---	
StB2:										
St. Clair	3C	Slight	Moderate	Severe	Severe	Moderate	Northern red oak	66	43	Austrian pine, black oak, green ash, pin oak, red maple, tuliptree, white ash, white oak.
							Sugar maple	---	---	
							White ash	---	---	
							White oak	62	43	
StC2:										
St. Clair	3C	Slight	Moderate	Severe	Severe	Moderate	Northern red oak	66	43	Austrian pine, black oak, green ash, pin oak, red maple, tuliptree, white ash, white oak.
							Sugar maple	---	---	
							White ash	---	---	
							White oak	62	43	
StD2:										
St. Clair	3R	Moderate	Moderate	Severe	Severe	Moderate	Northern red oak	66	43	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, tuliptree, white oak.
							Sugar maple	---	---	
							White ash	---	---	
							White oak	62	43	
StE2:										
St. Clair	3R	Moderate	Moderate	Severe	Severe	Moderate	Northern red oak	66	43	Norway spruce, black cherry, black walnut, eastern white pine, green ash, northern red oak, tuliptree, white oak.
							Sugar maple	---	---	
							White ash	---	---	
							White oak	62	43	

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
SuC3:										
St. Clair------	3C	Slight	Moderate	Severe	Severe	Moderate	Northern red oak----	66	43	Austrian pine,
							Sugar maple---------	---	---	black oak,
							White ash-----------	---	---	green ash, pin
							White oak-----------	62	43	oak, red
										maple,
										tuliptree,
										white ash,
										white oak.
SuE3:										
St. Clair------	3R	Moderate	Moderate	Severe	Severe	Moderate	Northern red oak----	66	43	Norway spruce,
							Sugar maple---------	---	---	black cherry,
							White ash-----------	---	---	black walnut,
							White oak-----------	62	43	eastern white
										pine, green
										ash, northern
										red oak,
										tuliptree,
										white oak.
TeA:										
Tedrow---------	4S	Slight	Slight	Severe	Slight	Moderate	Black oak-----------	---	---	Black oak,
							Bur oak-------------	75	57	black walnut,
							Green ash-----------	---	---	eastern white
							Northern red oak----	---	---	pine, northern
							Quaking aspen-------	---	---	red oak, white
							Red maple-----------	---	---	ash, white
							Slippery elm--------	---	---	oak.
Tn:										
Toledo---------	4W	Slight	Moderate	Severe	Severe	Severe	Eastern cottonwood--	---	---	American
							Green ash-----------	---	---	sycamore,
							Pin oak-------------	80	57	Norway spruce,
							Red maple-----------	---	---	eastern
							Swamp white oak-----	80	---	cottonwood,
										green ash, pin
										oak, red
										maple, silver
										maple, swamp
										white oak,
										sweetgum,
										white ash.
To:										
Toledo---------	4W	Slight	Moderate	Severe	Severe	Severe	Eastern cottonwood--	---	---	American
							Green ash-----------	---	---	sycamore,
							Pin oak-------------	80	57	Norway spruce,
							Red maple-----------	---	---	eastern
							Swamp white oak-----	80	---	cottonwood,
										green ash, pin
										oak, red
										maple, silver
										maple, swamp
										white oak,
										sweetgum,
										white ash.

See footnote at end of table.

Table 10.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol	Management concerns					Potential productivity			Suggested trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume*	
Wb:										
Wabasha--------	4W	Slight	Severe	Severe	Severe	Severe	Black cherry--------	---	---	American sycamore, Norway spruce, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum, white ash.
							Eastern cottonwood--	---	---	
							Green ash----------	---	---	
							Pin oak------------	80	57	
							Red maple----------	---	---	
							Swamp white oak-----	---	---	
WhA:										
Whitaker-------	4A	Slight	Slight	Moderate	Slight	Severe	Northern red oak----	75	57	American sycamore, eastern cottonwood, pin oak, red maple, swamp white oak, sweetgum, tuliptree.
							Pin oak------------	85	72	
							Sweetgum-----------	80	86	
							Tuliptree----------	85	86	
							White oak----------	70	57	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of the mean annual increment for fully stocked natural stands.

Table 11.--Windbreaks and Environmental Plantings

(Only the soils suitable for windbreaks and environmental plantings are listed. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BeB:					
Belmore	Japanese tree lilac, Siberian peashrub, redbud.	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar.	Austrian pine, Osage-orange, blue spruce, eastern white pine, Norway spruce, northern whitecedar.	White oak, white spruce.	Northern red oak, white ash, eastern white pine.
BkA:					
Bixler	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
BrB2:					
Broughton	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
BrC2:					
Broughton	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
BrD2:					
Broughton	American cranberrybush.	Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, Austrian pine.	Green ash, eastern white pine.	Northern red oak.
BrE2:					
Broughton	American cranberrybush.	Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, Austrian pine.	Green ash, eastern white pine.	Northern red oak.
BsC3:					
Broughton	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
BsD3:					
Broughton	American cranberrybush.	Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, Austrian pine.	Green ash, eastern white pine.	Northern red oak.
Db:					
Defiance	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white 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
Dc:					
Defiance	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
Fb:					
Flatrock	Silky dogwood	American cranberrybush, blackhaw, European alder, Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, blue spruce, northern whitecedar.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Fc:					
Flatrock	Silky dogwood	American cranberrybush, blackhaw, European alder, Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, blue spruce, northern whitecedar.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
FtA:					
Fulton	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
FuA:					
Fulton	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
FuB2:					
Fulton	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white 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
FxA:					
Fulton	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
FxB:					
Fulton	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
Gr:					
Granby	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
HaA:					
Haskins	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
HkA:					
Haskins	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
HkB:					
Haskins	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
Hs:					
Hoytville	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
Ht:					
Hoytville	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	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
Kn:					
Knoxdale------	Japanese tree lilac, Siberian peashrub, redbud.	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar.	Austrian pine, Osage-orange, blue spruce, eastern white pine, Norway spruce, northern whitecedar.	White oak, white spruce.	Northern red oak, white ash, eastern white pine.
La:					
Landes--------	Silky dogwood-------	American cranberrybush, blackhaw, European alder, Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, blue spruce, northern whitecedar.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Lb:					
Latty---------	Silky dogwood-------	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
Lc:					
Latty---------	Silky dogwood-------	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
LtA:					
Lucas---------	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
LuB2:					
Lucas---------	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
LuC2:					
Lucas---------	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
Md:					
Medway--------	Silky dogwood-------	American cranberrybush, blackhaw, European alder, Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, blue spruce, northern whitecedar.	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
Me:					
Mermill	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
Mg:					
Millgrove	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
NnA:					
Nappanee	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
NpA:					
Nappanee	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
NpB:					
Nappanee	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
NpB2:					
Nappanee	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
OsB:					
Oshtemo	Japanese tree lilac, Siberian peashrub, redbud.	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar.	Austrian pine, Osage-orange, blue spruce, eastern white pine, Norway spruce, northern whitecedar.	White oak, white spruce.	Northern red oak, white ash, 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
OtB:					
Ottokee	Redbud	American cranberrybush, Washington hawthorn.	Blue spruce, northern whitecedar.	Austrian pine, Norway spruce.	Eastern white pine.
Pc:					
Paulding	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
RkA:					
Rimer	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
RkB:					
Rimer	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
RmA:					
Rimer	Silky dogwood	American cranberrybush, European alder, Washington hawthorn.	Baldcypress, eastern redcedar, northern whitecedar, Austrian pine.	Pin oak, Norway spruce.	Green ash.
Fulton	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
RnA:					
Roselms	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
RoA:					
Roselms	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white 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
RoB:					
Roselms	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
RpA:					
Roselms	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
RpB2:					
Roselms	Silky dogwood, southern arrowwood.	American cranberrybush, European alder, Washington hawthorn, baldcypress, blackhaw, eastern redcedar.	Green ash, Osage-orange, Austrian pine, Norway spruce, northern whitecedar.	Shumard's oak, pin oak.	Swamp white oak.
Rt:					
Rossburg	Japanese tree lilac, Siberian peashrub, redbud.	European alder, radiant crabapple, Siberian crabapple, Washington hawthorn, eastern redcedar.	Austrian pine, Osage-orange, blue spruce, eastern white pine, Norway spruce, northern whitecedar.	White oak, white spruce.	Northern red oak, white ash, eastern white pine.
Sb:					
Saranac	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
Sh:					
Shoals	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
Sk:					
Shoals	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	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
StB2:					
St. Clair	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
StC2:					
St. Clair	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
StD2:					
St. Clair	American cranberrybush.	Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, Austrian pine.	Green ash, eastern white pine.	Northern red oak.
StE2:					
St. Clair	American cranberrybush.	Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, Austrian pine.	Green ash, eastern white pine.	Northern red oak.
SuC3:					
St. Clair	American cranberrybush, blackhaw.	Southern arrowwood, Washington hawthorn, eastern redcedar.	Baldcypress, Osage-orange, Austrian pine, northern whitecedar.	Norway spruce, green ash, black oak, pin oak.	Northern red oak.
SuE3:					
St. Clair	American cranberrybush.	Washington hawthorn, eastern redcedar, southern arrowwood.	Osage-orange, Austrian pine.	Green ash, eastern white pine.	Northern red oak.
TeA:					
Tedrow	Redbud	American cranberrybush, Washington hawthorn.	Blue spruce, northern whitecedar.	Austrian pine, Norway spruce.	Eastern white pine.
Tn:					
Toledo	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
To:					
Toledo	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.
Wb:					
Wabasha	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	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
WhA: Whitaker	Silky dogwood	American cranberrybush, European alder, baldcypress.	Washington hawthorn, northern whitecedar, Austrian pine, eastern redcedar, green ash.	Norway spruce, swamp white oak.	Pin oak.

Table 12.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. 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
BeB: Belmore	Slight	Slight	Moderate: slope.	Slight	Slight.
BkA: Bixler	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: too sandy, wetness.	Moderate: wetness, too sandy.	Moderate: wetness.
BrB2: Broughton	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
BrC2: Broughton	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
BrD2: Broughton	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
BrE2: Broughton	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, erodes easily.	Severe: slope.
BsC3: Broughton	Severe: percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: slope, too clayey, percs slowly.	Severe: too clayey.	Severe: too clayey.
BsD3: Broughton	Severe: slope, percs slowly, too clayey.	Severe: slope, too clayey, percs slowly.	Severe: slope, too clayey, percs slowly.	Severe: too clayey.	Severe: slope, too clayey.
Db: Defiance	Severe: flooding, wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Dc: Defiance	Severe: flooding, wetness.	Moderate: flooding, wetness, percs slowly.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
Fb: Flatrock	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
Fc: Flatrock	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FtA:					
Fulton	Severe: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
FuA:					
Fulton	Severe: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
FuB2:					
Fulton	Severe: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
FxA:					
Fulton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
FxB:					
Fulton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Gr:					
Granby	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
HaA:					
Haskins	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness, too sandy.	Moderate: wetness.
HkA:					
Haskins	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
HkB:					
Haskins	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Hs:					
Hoytville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ht:					
Hoytville	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
Kn:					
Knoxdale	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
La:					
Landes	Severe: flooding.	Slight	Moderate: slope.	Slight	Moderate: flooding.
Lb:					
Latty	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
Lc:					
Latty	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
LtA:					
Lucas	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight	Slight.
LuB2:					
Lucas	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
LuC2:					
Lucas	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Md:					
Medway	Severe: flooding.	Moderate: wetness.	Moderate: flooding, wetness.	Moderate: wetness.	Moderate: flooding, wetness.
Me:					
Mermill	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
Mg:					
Millgrove	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
NnA:					
Nappanee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
NpA:					
Nappanee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
NpB:					
Nappanee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
NpB2:					
Nappanee	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
OsB:					
Oshtemo	Slight	Slight	Moderate: slope.	Slight	Slight.
OtB:					
Ottokee	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: slope, too sandy, wetness.	Moderate: too sandy.	Moderate: droughty.

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pc:					
Paulding	Severe: ponding, percs slowly, too clayey.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, percs slowly.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
Pt:					
Pits, quarry.					
RkA:					
Rimer	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
RkB:					
Rimer	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
RmA:					
Rimer	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
Fulton	Severe: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
RnA:					
Roselms	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
RoA:					
Roselms	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
RoB:					
Roselms	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
RpA:					
Roselms	Severe: wetness, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: too clayey.	Severe: too clayey.
RpB2:					
Roselms	Severe: wetness, percs slowly, too clayey.	Severe: too clayey, percs slowly.	Severe: too clayey, wetness, percs slowly.	Severe: too clayey.	Severe: too clayey.
Rt:					
Rossburg	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Sb:					
Saranac	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Sh:					
Shoals	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Sk:					
Shoals	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
StB2:					
St. Clair	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
StC2:					
St. Clair	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
StD2:					
St. Clair	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
StE2:					
St. Clair	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
SuC3:					
St. Clair	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
SuE3:					
St. Clair	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: slope, too clayey.
TeA:					
Tedrow	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
Tn:					
Toledo	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
To:					
Toledo	Severe: ponding, too clayey.	Severe: ponding, too clayey.	Severe: too clayey, ponding.	Severe: ponding, too clayey.	Severe: ponding, too clayey.
Uc:					
Udorthents.					
Wb:					
Wabasha	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WhA: Whitaker--------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

Table 13.--Wildlife Habitat

(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	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
BeB:										
Belmore	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BkA:										
Bixler	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
BrB2:										
Broughton	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BrC2:										
Broughton	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BrD2:										
Broughton	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BrE2:										
Broughton	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BsC3:										
Broughton	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BsD3:										
Broughton	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Db:										
Defiance	Fair	Good	Fair	Good	Good	Good	Good	Good	Good	Good.
Dc:										
Defiance	Poor	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Fb:										
Flatrock	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Fc:										
Flatrock	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
FtA:										
Fulton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
FuA:										
Fulton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
FuB2:										
Fulton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FxA:										
Fulton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

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 herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
FxB:										
Fulton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Gr:										
Granby	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
HaA:										
Haskins	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
HkA:										
Haskins	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
HkB:										
Haskins	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hs:										
Hoytville	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Ht:										
Hoytville	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Kn:										
Knoxdale	Good	Good	Good	Good	Good	Poor	Good	Good	Good	Poor.
La:										
Landes	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Lb:										
Latty	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Lc:										
Latty	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
LtA:										
Lucas	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
LuB2:										
Lucas	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LuC2:										
Lucas	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Md:										
Medway	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Me:										
Mermill	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Mg:										
Millgrove	Fair	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
NnA:										
Nappanee	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
NpA:										
Nappanee	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

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 herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
NpB:										
Nappanee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
NpB2:										
Nappanee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
OsB:										
Oshtemo	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OtB:										
Ottokee	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Pc:										
Paulding	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Pt:										
Pits, quarry.										
RkA:										
Rimer	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
RkB:										
Rimer	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
RmA:										
Rimer	Poor	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Fair.
Fulton	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RnA:										
Roselms	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
RoA:										
Roselms	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
RoB:										
Roselms	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RpA:										
Roselms	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
RpB2:										
Roselms	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rt:										
Rossburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sb:										
Saranac	Poor	Poor	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
Sh:										
Shoals	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Sk:										
Shoals	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.

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 herba-ceous plants	Hard-wood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
StB2:										
St. Clair	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
StC2:										
St. Clair	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
StD2:										
St. Clair	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
StE2:										
St. Clair	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SuC3:										
St. Clair	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
SuE3:										
St. Clair	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
TeA:										
Tedrow	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Tn:										
Toledo	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
To:										
Toledo	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Uc:										
Udorthents.										
Wb:										
Wabasha	Poor	Poor	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
WhA:										
Whitaker	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

Table 14.--Building Site Development

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BeB:						
Belmore	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Slight.
BkA:						
Bixler	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness.
BrB2:						
Broughton	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
BrC2:						
Broughton	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, slope.
BrD2:						
Broughton	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
BrE2:						
Broughton	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
BsC3:						
Broughton	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: too clayey.
BsD3:						
Broughton	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, too clayey.
Db:						
Defiance	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: wetness, flooding.
Dc:						
Defiance	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: flooding.
Fb:						
Flatrock	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: wetness, flooding.

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
Fc:						
Flatrock	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.
FtA:						
Fulton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, frost action.	Moderate: wetness.
FuA:						
Fulton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, frost action.	Moderate: wetness.
FuB2:						
Fulton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, frost action.	Moderate: wetness.
FxA:						
Fulton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
FxB:						
Fulton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
Gr:						
Granby	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
HaA:						
Haskins	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
HkA:						
Haskins	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
HkB:						
Haskins	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Hs:						
Hoytville	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, 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
Ht:						
Hoytville	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
Kn:						
Knoxdale	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
La:						
Landes	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Lb:						
Latty	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, ponding, low strength.	Severe: ponding.
Lc:						
Latty	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, ponding, low strength.	Severe: ponding, too clayey.
LtA:						
Lucas	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
LuB2:						
Lucas	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
LuC2:						
Lucas	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
Md:						
Medway	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action, low strength.	Moderate: flooding, wetness.
Me:						
Mermill	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Mg:						
Millgrove	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
NnA:						
Nappanee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, 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
NpA:						
Nappanee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
NpB:						
Nappanee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
NpB2:						
Nappanee	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
OsB:						
Oshtemo	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: frost action.	Slight.
OtB:						
Ottokee	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: droughty.
Pc:						
Paulding	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding, too clayey.
Pt:						
Pits, quarry.						
RkA:						
Rimer	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
RkB:						
Rimer	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
RmA:						
Rimer	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
Fulton	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, frost action.	Moderate: wetness.
RnA:						
Roselms	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, droughty.

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
RoA:						
Roselms	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, droughty.
RoB:						
Roselms	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness, droughty.
RpA:						
Roselms	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Severe: too clayey.
RpB2:						
Roselms	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Severe: too clayey.
Rt:						
Rossburg	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Sb:						
Saranac	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
Sh:						
Shoals	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness.
Sk:						
Shoals	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness, flooding.
StB2:						
St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
StC2:						
St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
StD2:						
St. Clair	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, 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
StE2:						
St. Clair	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
SuC3:						
St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: too clayey.
SuE3:						
St. Clair	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: slope, wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, too clayey.
TeA:						
Tedrow	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Tn:						
Toledo	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
To:						
Toledo	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.
Uc:						
Udorthents.						
Wb:						
Wabasha	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, flooding.
WhA:						
Whitaker	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.

Table 15.--Sanitary Facilities

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BeB:					
Belmore	Severe: wetness, poor filter.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Fair: too clayey, wetness.
BkA:					
Bixler	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage.	Poor: too sandy.
BrB2:					
Broughton	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
BrC2:					
Broughton	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
BrD2:					
Broughton	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
BrE2:					
Broughton	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
BsC3:					
Broughton	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
BsD3:					
Broughton	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: wetness, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Db:					
Defiance	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Dc:					
Defiance	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

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
Fb:					
Flatrock	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
Fc:					
Flatrock	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.
FtA:					
Fulton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
FuA:					
Fulton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
FuB2:					
Fulton	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
FxA:					
Fulton	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
FxB:					
Fulton	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Gr:					
Granby	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
HaA:					
Haskins	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
HkA:					
Haskins	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

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
HkB:					
Haskins	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Hs:					
Hoytville	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Ht:					
Hoytville	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Kn:					
Knoxdale	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
La:					
Landes	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: seepage.
Lb:					
Latty	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, ponding, hard to pack.
Lc:					
Latty	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: too clayey, ponding, hard to pack.
LtA:					
Lucas	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
LuB2:					
Lucas	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
LuC2:					
Lucas	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
Md:					
Medway	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Fair: wetness.

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
Me:					
Mermill	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Mg:					
Millgrove	Severe: ponding.	Severe: seepage, ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
NnA:					
Nappanee	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
NpA:					
Nappanee	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
NpB:					
Nappanee	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
NpB2:					
Nappanee	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
OsB:					
Oshtemo	Severe: wetness.	Severe: seepage, wetness.	Moderate: wetness.	Severe: seepage.	Fair: wetness.
OtB:					
Ottokee	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
Pc:					
Paulding	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Pt:					
Pits, quarry.					
RkA:					
Rimer	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.

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
RkB:					
Rimer	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
RmA:					
Rimer	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
Fulton	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
RnA:					
Roselms	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
RoA:					
Roselms	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
RoB:					
Roselms	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
RpA:					
Roselms	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack,
RpB2:					
Roselms	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack,
Rt:					
Rossburg	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Good.
Sb:					
Saranac	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Sh:					
Shoals	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

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
Sk:					
Shoals	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
StB2:					
St. Clair	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
StC2:					
St. Clair	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
StD2:					
St. Clair	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
StE2:					
St. Clair	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
SuC3:					
St. Clair	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
SuE3:					
St. Clair	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
TeA:					
Tedrow	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
Tn:					
Toledo	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
To:					
Toledo	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Uc:					
Udorthents.					
Wb:					
Wabasha	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.

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
WhA: Whitaker--------	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.

Table 16.--Construction Materials

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BeB:				
Belmore	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
BkA:				
Bixler	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
BrB2:				
Broughton	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BrC2:				
Broughton	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BrD2:				
Broughton	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
BrE2:				
Broughton	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
BsC3:				
Broughton	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BsD3:				
Broughton	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Db:				
Defiance	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Dc:				
Defiance	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Fb:				
Flatrock	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Fc:				
Flatrock	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FtA:				
Fulton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FuA:				
Fulton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FuB2:				
Fulton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FxA:				
Fulton	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
FxB:				
Fulton	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Gr:				
Granby	Poor: wetness.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, wetness.
HaA:				
Haskins	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
HkA:				
Haskins	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
HkB:				
Haskins	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
Hs:				
Hoytville	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Ht:				
Hoytville	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Kn:				
Knoxdale	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
La:				
Landes	Good	Improbable: excess fines.	Improbable: too sandy.	Fair: small stones, thin layer.
Lb:				
Latty	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Lc:				
Latty	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
LtA:				
Lucas	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
LuB2:				
Lucas	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
LuC2:				
Lucas	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Md:				
Medway	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Me:				
Mermill	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Mg:				
Millgrove	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NnA:				
Nappanee	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
NpA:				
Nappanee	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
NpB:				
Nappanee	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
NpB2:				
Nappanee	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
OsB:				
Oshtemo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
OtB:				
Ottokee	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Pc:				
Paulding	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Pt:				
Pits, quarry.				
RkA:				
Rimer	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
RkB:				
Rimer	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
RmA:				
Rimer	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Fulton	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RnA:				
Roselms	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RoA:				
Roselms	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RoB:				
Roselms	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RpA:				
Roselms	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RpB2:				
Roselms	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Rt:				
Rossburg	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Sb:				
Saranac	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Sh:				
Shoals	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Sk:				
Shoals	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
StB2:				
St. Clair	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
StC2:				
St. Clair	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
StD2:				
St. Clair	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
StE2:				
St. Clair	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
SuC3:				
St. Clair	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
SuE3:				
St. Clair	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
TeA:				
Tedrow	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Tn:				
Toledo	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
To:				
Toledo	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

Table 16.--Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Uc: Udorthents.				
Wb: Wabasha	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
WhA: Whitaker	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

Table 17.--Water Management

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

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
BeB:							
Belmore	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
BkA:							
Bixler	Severe: seepage.	Severe: piping, wetness.	Severe: no water.	Frost action, cutbanks cave.	Fast intake, wetness, droughty.	Erodes easily, wetness, too sandy.	Erodes easily, droughty, rooting depth.
BrB2:							
Broughton	Moderate: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, droughty.	Erodes easily, wetness.	Erodes easily, droughty, percs slowly.
BrC2:							
Broughton	Severe: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, droughty.	Slope, erodes easily, wetness.	Slope, erodes easily, droughty.
BrD2:							
Broughton	Severe: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, droughty.	Slope, erodes easily, wetness.	Slope, erodes easily, droughty.
BrE2:							
Broughton	Severe: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, droughty.	Slope, erodes easily, wetness.	Slope, erodes easily, droughty.
BsC3:							
Broughton	Severe: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, slow intake, droughty.	Slope, percs slowly, wetness.	Slope, droughty, percs slowly.
BsD3:							
Broughton	Severe: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, slow intake, droughty.	Slope, percs slowly, wetness.	Slope, droughty, percs slowly.
Db:							
Defiance	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

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
Dc:							
Defiance	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Fb:							
Flatrock	Severe: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.
Fc:							
Flatrock	Severe: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Erodes easily, flooding.	Erodes easily, wetness.	Erodes easily.
FtA:							
Fulton	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
FuA:							
Fulton	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
FuB2:							
Fulton	Moderate: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
FxA:							
Fulton	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
FxB:							
Fulton	Moderate: seepage, slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Gr:							
Granby	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, cutbanks cave.	Ponding, droughty, fast intake.	Ponding, too sandy, soil blowing.	Wetness, 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
HaA:							
Haskins	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Fast intake, wetness, droughty.	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, droughty.
HkA:							
Haskins	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
HkB:							
Haskins	Moderate: seepage, slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
Hs:							
Hoytville	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, rooting depth, percs slowly.
Ht:							
Hoytville	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding, droughty, slow intake.	Ponding, percs slowly.	Wetness, rooting depth, percs slowly.
Kn:							
Knoxdale	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
La:							
Landes	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, flooding.	Favorable	Favorable.
Lb:							
Latty	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Lc:							
Latty	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.

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
LtA:							
Lucas	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Percs slowly	Erodes easily, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
LuB2:							
Lucas	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, percs slowly.
LuC2:							
Lucas	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, droughty, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Md:							
Medway	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Frost action, flooding.	Flooding	Wetness	Favorable.
Me:							
Mermill	Moderate: seepage.	Severe: ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, rooting depth, percs slowly.
Mg:							
Millgrove	Severe: seepage.	Severe: thin layer, ponding.	Severe: no water.	Ponding, frost action.	Ponding	Ponding	Wetness.
NnA:							
Nappanee	Slight	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, droughty, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
NpA:							
Nappanee	Slight	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, droughty, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
NpB:							
Nappanee	Moderate: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, droughty.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.

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
NpB2:							
Nappanee	Moderate: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, droughty.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
OsB:							
Oshtemo	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Soil blowing	Favorable.
OtB:							
Ottokee	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Slope, cutbanks cave.	Fast intake, slope, droughty.	Wetness, too sandy, soil blowing.	Droughty.
Pc:							
Paulding	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Pt:							
Pits, quarry.							
RkA:							
Rimer	Severe: seepage.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Fast intake, wetness, droughty.	Wetness, soil blowing, percs slowly.	Wetness, droughty, rooting depth.
RkB:							
Rimer	Severe: seepage.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Fast intake, slope, wetness.	Wetness, soil blowing, percs slowly.	Wetness, droughty, rooting depth.
RmA:							
Rimer	Severe: seepage.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Fast intake, wetness, droughty.	Wetness, soil blowing, percs slowly.	Wetness, droughty, rooting depth.
Fulton	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
RnA:							
Roselms	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, 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
RoA:							
Roselms	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, droughty, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, droughty.
RoB:							
Roselms	Moderate: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, droughty.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, droughty.
RpA:							
Roselms	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action.	Slow intake, wetness, droughty.	Wetness, percs slowly.	Wetness, droughty, percs slowly.
RpB2:							
Roselms	Moderate: slope.	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slow intake, slope, wetness.	Wetness, percs slowly.	Wetness, droughty, percs slowly.
Rt:							
Rossburg	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, flooding.	Erodes easily	Erodes easily.
Sb:							
Saranac	Slight	Severe: wetness, hard to pack.	Severe: slow refill.	Flooding, frost action.	Wetness	Wetness	Wetness, rooting depth.
Sh:							
Shoals	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
Sk:							
Shoals	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
StB2:							
St. Clair	Moderate: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Erodes easily, wetness, percs slowly.	Erodes easily, rooting depth, percs slowly.
StC2:							
St. Clair	Severe: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.

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
StD2:							
St. Clair	Severe: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
StE2:							
St. Clair	Severe: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
SuC3:							
St. Clair	Severe: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, slow intake, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.
SuE3:							
St. Clair	Severe: slope.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Slope, slow intake, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily, droughty.
TeA:							
Tedrow	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Fast intake, wetness, droughty.	Wetness, too sandy, soil blowing.	Wetness, droughty.
Tn:							
Toledo	Slight	Severe: ponding, hard to pack.	Slight	Ponding, percs slowly, frost action.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
To:							
Toledo	Slight	Severe: ponding, hard to pack.	Slight	Ponding, percs slowly, frost action.	Ponding, slow intake, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.
Uc:							
Udorthents.							
Wb:							
Wabasha	Slight	Severe: wetness, hard to pack.	Severe: slow refill.	Percs slowly, flooding, frost action.	Wetness, percs slowly, flooding.	Wetness, percs slowly.	Wetness, percs slowly.

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
WhA: Whitaker	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Frost action	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.

Table 18.--Engineering Index Properties

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
BeB:												
Belmore	0-6	Loam	ML, CL-ML, CL	A-4	0	0	85-100	85-100	60-90	50-80	20-32	3-10
	6-39	Sandy clay loam, clay loam, loam.	SC, SC-SM, CL, CL-ML	A-4, A-6	0	0	85-100	75-100	55-75	40-70	20-36	4-14
	39-75	Sandy loam, very gravelly loam, gravelly coarse sandy loam.	SM, SC, SC-SM, ML	A-2, A-4, A-1	0	0	80-100	55-85	30-75	15-60	10-30	NP-10
	75-80	Clay loam, silty clay loam, silty clay.	CL	A-7, A-6	0-1	0-5	100	85-100	80-100	75-95	25-50	10-25
BkA:												
Bixler	0-10	Loamy sand	SM	A-2	0	0	100	90-100	50-70	15-30	0	NP
	10-28	Loamy sand, sand.	SM	A-2, A-4	0	0	100	90-100	60-85	20-45	0	NP
	28-36	Sandy loam, loam, fine sandy loam.	SM, SC-SM, SC, ML	A-2, A-4	0	0	100	100	60-90	30-70	10-25	NP-10
	36-74	Silt loam, silty clay loam, very fine sandy loam.	CL, ML, SC, SM	A-4, A-6	0	0	100	100	70-100	35-90	10-35	3-20
	74-80	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	0-2	100	100	80-100	70-100	40-60	18-34
BrB2:												
Broughton	0-6	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-95	35-50	15-28
	6-17	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	17-80	Clay	CH	A-7	0	0	100	100	90-100	90-100	60-85	30-50
BrC2:												
Broughton	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-95	35-50	15-28
	8-18	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	18-80	Clay	CH	A-7	0	0	100	100	90-100	90-100	60-85	30-50

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
BrD2:												
Broughton	0-6	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-95	35-50	15-28
	6-16	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	16-80	Clay	CH	A-7	0	0	100	100	90-100	90-100	60-85	30-50
BrE2:												
Broughton	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-95	35-50	15-28
	8-22	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	22-80	Clay	CH	A-7	0	0	100	100	90-100	90-100	60-85	30-50
BsC3:												
Broughton	0-5	Silty clay	CL, CH	A-7	0	0	100	100	95-100	85-95	40-65	15-40
	5-12	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	12-80	Clay	CH	A-7	0	0	100	100	90-100	90-100	60-85	30-50
BsD3:												
Broughton	0-5	Silty clay	CL, CH	A-7	0	0	100	100	95-100	85-95	40-65	15-40
	5-11	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	11-80	Clay	CH	A-7	0	0	100	100	90-100	90-100	60-85	30-50
Db:												
Defiance	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	85-100	70-100	65-95	35-50	12-25
	8-48	Silty clay loam, clay, silty clay.	CH, CL	A-7	0	0	100	75-100	65-100	60-95	40-65	20-35
	48-80	Silty clay, clay.	CH, CL	A-7	0	0	100	75-100	65-100	60-95	40-65	20-35
Dc:												
Defiance	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	85-100	70-100	65-95	35-50	12-25
	8-34	Silty clay, clay, clay loam.	CH, CL	A-7	0	0	100	75-100	65-100	60-95	40-65	20-35
	34-80	Silty clay, clay.	CH, CL	A-7	0	0	100	75-100	65-100	60-95	40-65	20-35
Fb:												
Flatrock	0-10	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	85-100	70-90	24-40	3-15
	10-38	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	24-40	3-15
	38-80	Loam, silt loam, sandy loam.	ML, CL, SM	A-4, A-6	0	0	100	100	60-90	40-80	15-35	3-15

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Fc:												
Flatrock--------	0-13	Silt loam------	ML, CL, CL-ML	A-4, A-6	0	0	100	100	85-100	70-90	24-40	3-15
	13-44	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	85-100	60-90	24-40	3-15
	44-80	Loam, silt loam, fine sandy loam.	ML, CL, SM	A-4, A-6	0	0	100	100	60-90	40-80	15-35	3-15
FtA:												
Fulton----------	0-10	Loam----------	CL, ML, CL-ML	A-6, A-4	0	0	100	100	85-100	70-90	24-40	3-16
	10-37	Silty clay, clay.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
	37-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
FuA:												
Fulton----------	0-10	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	80-95	35-50	12-25
	10-38	Silty clay, clay.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
	38-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
FuB2:												
Fulton----------	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	80-95	35-50	12-25
	7-31	Silty clay, clay.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
	31-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
FxA:												
Fulton----------	0-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	80-95	35-50	12-25
	9-44	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	0	100	100	90-100	85-100	40-60	18-34
	44-80	Silt loam, clay loam, fine sandy loam.	CL, CL-ML	A-4, A-6, A-7	0	0	100	100	60-80	50-70	25-45	8-20
FxB:												
Fulton----------	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	80-95	35-50	12-25
	8-51	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	0	100	100	90-100	85-100	40-60	18-34
	51-80	Silt loam, clay loam, loam.	CL, CL-ML	A-4	0	0	100	100	60-80	50-70	25-45	8-20

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Gr:												
Granby----------	0-13	Loamy sand-----	SM	A-2	0	0	100	100	50-75	15-30	0	NP
	13-37	Sand, loamy sand.	SP, SP-SM, SM	A-3, A-2	0	0	100	100	50-75	0-20	0	NP
	37-59	Sand, loamy sand.	SP, SP-SM	A-3, A-2	0	0	100	100	50-70	0-5	0	NP
	59-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	18-34
HaA:												
Haskins---------	0-15	Loamy sand, loamy fine sand.	SM	A-4, A-2-4	0	0	100	85-100	60-80	25-45	0	NP
	15-34	Clay loam, gravelly sandy clay loam, fine sandy loam.	SC, CL	A-6, A-4, A-2	0	0	85-100	70-100	55-85	30-65	20-40	7-20
	34-80	Clay, silty clay, clay loam.	CH, CL	A-7, A-6	0	0	100	85-100	80-100	70-95	35-65	15-40
HkA:												
Haskins---------	0-9	Loam-----------	CL-ML, CL	A-4, A-6	0	0	95-100	85-100	70-100	55-90	25-40	5-20
	9-35	Clay loam, gravelly sandy clay loam, fine sandy loam.	SC, CL	A-6, A-4, A-2	0	0	85-100	70-100	55-85	30-65	20-40	7-20
	35-80	Clay, silty clay, clay loam.	CH, CL	A-7, A-6	0	0	100	85-100	80-100	70-95	35-65	15-40
HkB:												
Haskins---------	0-9	Loam-----------	CL-ML, CL	A-4, A-6	0	0	95-100	85-100	70-100	55-90	25-40	5-20
	9-30	Clay loam, loam, gravelly fine sandy loam.	SC, CL	A-6, A-4, A-2	0	0	85-100	70-100	55-85	30-65	20-40	7-20
	30-80	Clay, silty clay loam, clay loam.	CH, CL	A-7, A-6	0	0	100	85-100	80-100	70-95	35-65	15-40

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Hs:												
Hoytville-------	0-9	Silty clay loam	CL	A-7	0	0-5	100	90-100	85-100	75-95	40-50	15-30
	9-39	Clay, silty clay.	CH, CL	A-7	0	0-5	100	90-100	80-100	75-100	42-66	22-40
	39-80	Clay, silty clay loam, clay loam.	CH, CL	A-7	0	0-5	100	85-100	80-100	75-100	40-62	22-40
Ht:												
Hoytville-------	0-9	Silty clay-----	CH, CL	A-7	0	0-5	100	90-100	85-100	80-95	45-66	22-40
	9-39	Clay, silty clay.	CH, CL	A-7	0	0-5	100	90-100	80-100	75-100	42-66	22-40
	39-80	Clay, silty clay loam, clay loam.	CH, CL	A-7	0	0-5	100	85-100	80-100	75-100	40-62	22-40
Kn:												
Knoxdale--------	0-9	Silt loam------	ML, CL, CL-ML	A-4, A-6	0	0	100	90-100	85-100	70-90	24-40	3-15
	9-35	Silt loam, loam	ML, CL, CL-ML	A-4, A-6	0	0	100	90-100	85-100	60-90	24-40	3-15
	35-80	Stratified silt loam to sandy loam.	ML, CL, CL-ML, SM	A-4, A-6	0	0	100	75-100	60-90	40-80	20-35	3-15
La:												
Landes----------	0-18	Loam-----------	CL, CL-ML	A-4, A-6	0	0	100	90-100	85-100	50-75	20-35	5-15
	18-26	Loam, very fine sandy loam, sandy loam.	SM, CL-ML, SC, SC-SM	A-4, A-2-4	0	0	100	85-100	70-100	15-60	10-25	NP-10
	26-80	Sand, loam, very fine sandy loam.	SM, SP-SM, SC, SC-SM	A-4, A-2-4	0	0	100	85-100	70-85	10-50	10-25	NP-10
Lb:												
Latty-----------	0-7	Silty clay loam	CL	A-7	0	0	100	100	95-100	85-100	40-50	20-30
	7-45	Clay, silty clay.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-65	20-40
	45-80	Clay, silty clay loam, clay loam.	CH, CL	A-7	0	0-2	95-100	90-100	85-100	70-95	40-60	15-35
Lc:												
Latty-----------	0-11	Silty clay-----	CH, CL	A-7	0	0	100	100	90-100	85-100	40-65	20-40
	11-42	Clay, silty clay.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-65	20-40
	42-80	Clay, silty clay, clay loam.	CH, CL	A-7	0	0-2	95-100	90-100	85-100	70-95	40-60	15-35

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
LtA:												
Lucas	0-9	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	25-35	10-15
	9-28	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	15-35
	28-48	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	15-35
	48-80	Sandy loam, clay loam, loam.	CL	A-4, A-6, A-7	0	0	100	100	80-95	50-80	25-45	8-20
LuB2:												
Lucas	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	80-95	30-45	10-25
	7-25	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	15-35
	25-44	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	15-35
	44-80	Sandy loam, clay loam, loam.	CL	A-4, A-6, A-7	0	0	100	100	80-95	50-80	25-45	8-20
LuC2:												
Lucas	0-7	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	80-95	30-45	10-25
	7-17	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	15-35
	17-36	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-95	40-65	15-35
	36-80	Fine sandy loam, clay loam, loam.	CL	A-4, A-6, A-7	0	0	100	100	80-95	50-80	25-45	8-20
Md:												
Medway	0-19	Silt loam	ML, CL, CL-ML	A-4, A-6	0	0	100	90-100	85-100	70-90	20-40	3-15
	19-41	Loam, silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	0	95-100	80-95	75-90	70-90	20-45	4-20
	41-58	Stratified sandy loam to silty clay loam.	ML, CL, SC, SM	A-4, A-2, A-6	0	0	90-100	75-100	45-95	25-75	15-30	NP-15
	58-80	Stratified gravelly loamy coarse sand to silt loam.	ML, CL, SM, SC	A-2, A-4, A-6, A-1-b	0	0-5	80-100	50-100	30-95	15-75	15-30	NP-15

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Me:												
Mermill---------	0-9	Loam----------	ML, CL, CL-ML	A-4, A-6	0	0	95-100	90-100	75-100	55-90	20-40	2-15
	9-37	Clay loam, sandy clay loam, loam.	SC, CL	A-6, A-7, A-4	0	0	90-100	85-100	70-85	40-75	24-44	8-22
	37-80	Clay, silty clay loam, clay loam.	CH, CL	A-7, A-6	0	0-2	100	85-100	80-100	70-95	38-65	18-40
Mg:												
Millgrove-------	0-15	Loam----------	ML, CL, CL-ML	A-4, A-6	0	0	90-100	85-100	70-95	50-75	20-40	3-16
	15-36	Sandy clay loam, clay loam, loam.	CL, SC	A-6, A-7	0	0	85-100	75-100	70-95	40-75	25-45	11-26
	36-50	Gravelly sandy loam, very gravelly sandy clay loam, loam.	CL, CL-ML, SC	A-4, A-6, A-2, A-1-b	0	0-5	60-100	45-85	25-80	15-60	25-40	4-20
	50-61	Stratified gravelly sandy loam to silt loam.	SM, ML, GM, GC	A-2, A-4	0	0-5	60-100	45-85	30-70	25-55	10-25	NP-10
	61-80	Silty clay loam, clay loam, silty clay.	CL	A-7, A-6	0-1	0-5	100	85-100	80-100	75-95	25-50	10-25
NnA:												
Nappanee--------	0-10	Loam----------	CL	A-6	0	0-5	95-100	90-100	85-100	55-90	30-40	10-15
	10-27	Silty clay, clay.	CH	A-7	0	0-5	95-100	90-100	85-100	70-95	50-70	25-45
	27-80	Silty clay loam, clay, clay loam.	CL, CH	A-7	0	0-5	95-100	90-100	85-100	70-95	40-60	20-35
NpA:												
Nappanee--------	0-10	Silty clay loam	CL	A-7	0	0-5	95-100	90-100	85-100	70-95	40-50	20-25
	10-27	Silty clay, clay.	CH	A-7	0	0-5	95-100	90-100	85-100	70-95	50-70	25-45
	27-80	Silty clay loam, clay, clay loam.	CL, CH	A-7	0	0-5	95-100	90-100	85-100	70-95	40-60	20-35

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
NpB:												
Nappanee--------	0-10	Silty clay loam	CL	A-7	0	0-5	95-100	90-100	85-100	70-95	40-50	20-25
	10-28	Silty clay, clay.	CH	A-7	0	0-5	95-100	90-100	85-100	70-95	50-70	25-45
	28-80	Silty clay loam, clay, clay loam.	CL, CH	A-7	0	0-5	95-100	90-100	85-100	70-95	40-60	20-35
NpB2:												
Nappanee--------	0-7	Silty clay loam	CL	A-7	0	0-5	95-100	90-100	85-100	70-95	40-50	20-25
	7-28	Silty clay, clay.	CH	A-7	0	0-5	95-100	90-100	85-100	70-95	50-70	25-45
	28-80	Silty clay loam, clay, clay loam.	CL, CH	A-7	0	0-5	95-100	90-100	85-100	70-95	40-60	20-35
OsB:												
Oshtemo---------	0-8	Sandy loam-----	SM, SC	A-2, A-4	0	0	95-100	85-100	55-70	25-40	15-25	2-7
	8-42	Sandy loam, sandy clay loam, coarse sandy loam.	SM, SC	A-2, A-4, A-6	0	0	90-100	70-100	45-80	25-45	15-30	2-16
	42-68	Sandy loam, loamy sand, gravelly loamy sand.	SM, SP-SM	A-2	0	0	85-95	60-95	55-70	10-30	0	NP
	68-74	Very gravelly loamy sand, gravelly loamy coarse sand, sand.	SP-SM, GP, SP, GP-GM	A-1, A-2, A-3	0	0-5	40-90	35-85	20-60	0-10	0	NP
	74-80	Silty clay, silty clay loam, clay loam.	CL	A-7, A-6	0-1	0-5	95-100	85-100	80-100	75-95	25-50	10-25
OtB:												
Ottokee---------	0-10	Loamy sand-----	SM	A-2, A-4	0	0	100	90-100	55-80	15-45	0	NP
	10-60	Loamy fine sand, sand, loamy sand.	SM	A-2	0	0	100	90-100	65-80	20-35	0	NP
	60-80	Fine sand, sand	SM, SW-SM, SP-SM	A-2, A-3	0	0	100	95-100	70-80	5-25	0	NP
Pc:												
Paulding--------	0-6	Clay-----------	CH, CL	A-7	0	0	100	100	95-100	90-100	40-80	20-46
	6-48	Clay-----------	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
	48-80	Clay-----------	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Pt:												
Pits, quarry.												
RkA:												
Rimer----------	0-9	Loamy sand-----	SM, ML	A-2, A-4, A-1	0	0	100	95-100	45-80	15-55	0	NP
	9-23	Loamy fine sand, fine sand, loamy sand.	SM	A-2, A-4	0	0	100	95-100	75-90	20-40	0	NP
	23-33	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC	A-4	0	0	100	95-100	60-80	35-50	15-30	NP-10
	33-80	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0	0	100	90-100	85-100	75-95	40-60	18-34
RkB:												
Rimer----------	0-10	Loamy sand-----	SM, ML	A-2, A-4, A-1	0	0	100	95-100	45-80	15-55	0	NP
	10-21	Loamy fine sand, fine sand, loamy sand.	SM	A-2, A-4	0	0	100	95-100	75-90	20-40	0	NP
	21-27	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC	A-4	0	0	100	95-100	60-80	35-50	15-30	NP-10
	27-80	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0	0	100	90-100	85-100	75-95	35-60	15-30
RmA:												
Rimer----------	0-8	Loamy sand-----	SM, ML	A-2, A-4, A-1	0	0	100	95-100	45-80	15-55	0	NP
	8-21	Loamy fine sand, fine sand, loamy sand.	SM	A-2, A-4	0	0	100	95-100	75-90	20-40	0	NP
	21-38	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC	A-4	0	0	100	95-100	60-80	35-50	15-30	NP-10
	38-80	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0	0	100	90-100	85-100	75-95	35-60	15-30

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
RmA:												
Fulton	0-8	Loam	CL, ML, CL-ML	A-6, A-4	0	0	100	100	85-100	70-90	24-40	3-16
	8-33	Silty clay, clay.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
	33-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	90-100	85-100	40-60	18-34
RnA:												
Roselms	0-9	Loam	ML, CL, CL-ML	A-4, A-6	0	0	100	100	75-95	55-80	20-40	3-16
	9-29	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-80	30-50
	29-80	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
RoA:												
Roselms	0-8	Silty clay loam	ML, CL	A-6, A-7	0	0	100	100	85-100	80-100	35-45	10-20
	8-23	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-80	30-50
	23-80	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
RoB:												
Roselms	0-9	Silty clay loam	ML, CL	A-6, A-7	0	0	100	100	85-100	80-100	35-45	10-20
	9-30	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-80	30-50
	30-80	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
RpA:												
Roselms	0-8	Silty clay	CH, CL	A-7, A-6	0	0	100	100	90-100	85-100	35-66	15-35
	8-34	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-80	30-50
	34-80	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
RpB2:												
Roselms	0-6	Silty clay	CH, CL	A-7, A-6	0	0	100	100	90-100	85-100	35-66	15-35
	6-26	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-80	30-50
	26-80	Clay	CH	A-7	0	0	100	100	95-100	90-100	60-85	30-50
Rt:												
Rossburg	0-15	Silt loam	CL-ML, CL, ML	A-4, A-6	0	0	95-100	90-100	80-100	60-90	20-35	5-15
	15-48	Silt loam, loam, sandy loam.	CL-ML, CL	A-4, A-6	0	0	90-100	85-100	70-95	50-80	20-40	5-15
	48-80	Fine sandy loam, loam, silt loam.	SM, SC, ML, CL	A-4, A-2-4	0	0	80-100	70-100	45-90	25-70	10-25	NP-10

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Sb:												
Saranac---------	0-11	Silty clay loam	CL	A-6, A-7	0	0	100	100	90-100	75-95	30-50	15-25
	11-46	Clay loam, silty clay, clay.	CL, CH	A-7	0	0	100	100	90-100	70-90	45-65	20-40
	46-80	Clay loam, silty clay, clay.	CL, CH	A-7	0	0	100	100	90-100	70-90	45-65	20-40
Sh:												
Shoals----------	0-8	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	65-90	20-40	6-15
	8-44	Silt loam, loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	75-85	25-45	5-20
	44-80	Loam, sandy loam, silt loam.	ML, CL, CL-ML	A-4	0	0-3	90-100	85-100	60-80	50-70	10-30	3-10
Sk:												
Shoals----------	0-8	Silt loam------	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	65-90	20-40	6-15
	8-44	Silt loam, loam, clay loam.	CL, CL-ML	A-4, A-6	0	0	100	95-100	90-100	75-85	25-45	5-20
	44-80	Loam, silt loam, sandy loam.	ML, CL, CL-ML	A-4	0	0-3	90-100	85-100	60-80	50-70	10-30	3-10
StB2:												
St. Clair-------	0-8	Silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	80-100	70-95	35-50	15-25
	8-25	Clay, silty clay.	CH, CL	A-7	0	0-5	95-100	90-100	75-100	65-95	45-60	20-35
	25-80	Clay loam, silty clay, silty clay loam.	CH, CL	A-7	0	0-5	95-100	90-100	70-100	60-95	45-60	20-35
StC2:												
St. Clair-------	0-6	Silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	80-100	70-95	35-50	15-25
	6-22	Clay, silty clay.	CH, CL	A-7	0	0-5	95-100	90-100	75-100	65-95	45-60	20-35
	22-80	Clay loam, silty clay, silty clay loam.	CH, CL	A-7	0	0-5	95-100	90-100	70-100	60-95	45-60	20-35

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
StD2:												
St. Clair-------	0-7	Silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	80-100	70-95	35-50	15-25
	7-21	Clay, silty clay.	CH, CL	A-7	0	0-5	95-100	90-100	75-100	65-95	45-60	20-35
	21-80	Clay loam, silty clay, silty clay loam.	CH, CL	A-7	0	0-5	95-100	90-100	70-100	60-95	45-60	20-35
StE2:												
St. Clair-------	0-3	Silty clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	80-100	70-95	35-50	15-25
	3-28	Clay, silty clay.	CH, CL	A-7	0	0-5	95-100	90-100	75-100	65-95	45-60	20-35
	28-80	Clay loam, silty clay, silty clay loam.	CH, CL	A-7	0	0-5	95-100	90-100	70-100	60-95	45-60	20-35
SuC3:												
St. Clair-------	0-8	Silty clay-----	CH, CL	A-7	0	0-5	95-100	90-100	85-100	70-95	45-60	20-35
	8-12	Clay, silty clay.	CH, CL	A-7	0	0-5	95-100	90-100	75-100	65-95	45-60	20-35
	12-80	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	0-5	95-100	90-100	70-100	60-95	45-60	20-35
SuE3:												
St. Clair-------	0-6	Silty clay-----	CH, CL	A-7	0	0-5	95-100	90-100	85-100	70-95	45-60	20-35
	6-9	Clay, silty clay.	CH, CL	A-7	0	0-5	95-100	90-100	75-100	65-95	45-60	20-35
	9-80	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	0-5	95-100	90-100	70-100	60-95	45-60	20-35
TeA:												
Tedrow----------	0-12	Loamy sand-----	SM	A-2	0	0	100	100	60-80	20-35	0	NP
	12-44	Loamy fine sand, loamy sand, sand.	SM, SP-SM	A-2, A-3	0	0	100	100	60-80	5-35	0	NP
	44-80	Sand, fine sand	SM, SP, SP-SM	A-2, A-3	0	0	100	100	50-70	3-35	0	NP
Tn:												
Toledo----------	0-9	Silty clay loam	CL, CH	A-7, A-6	0	0	100	100	90-100	80-100	35-54	14-24
	9-43	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	20-40
	43-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	20-40

Table 18.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
To:												
Toledo----------	0-9	Silty clay-----	CH, CL	A-7	0	0	100	100	90-100	80-100	45-65	20-35
	9-43	Silty clay, clay.	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	20-40
	43-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	95-100	80-100	45-65	20-40
Uc:												
Udorthents.												
Wb:												
Wabasha---------	0-9	Silty clay loam	CL, CH	A-7, A-6	0	0	100	100	90-100	80-95	35-55	15-30
	9-52	Silty clay, clay.	CH, CL	A-7	0	0	100	100	90-100	80-100	45-65	22-35
	52-80	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	0	100	100	90-100	80-100	40-65	18-35
WhA:												
Whitaker--------	0-13	Loam-----------	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	80-100	60-90	15-35	2-15
	13-44	Clay loam, silty clay loam, sandy clay loam.	CL, CL-ML	A-6, A-4	0	0	100	95-100	90-100	70-80	20-35	5-15
	44-60	Stratified silt to sand.	ML, SM, CL-ML, SC	A-4	0	0	98-100	95-100	60-85	40-60	0-25	NP-10

Table 19.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" 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	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
BeB:												
Belmore	0-6	10-24	1.30-1.45	0.60-2.00	0.14-0.18	Low	1.0-3.0	0.32	0.37	4	5	56
	6-39	15-30	1.35-1.60	2.00-6.00	0.10-0.14	Low	0.0-0.5	0.32	0.37			
	39-75	5-15	1.50-1.70	6.00-20.00	0.08-0.12	Low	0.0-0.5	0.24	0.43			
	75-80	27-42	1.40-1.75	0.06-0.20	0.05-0.10	Moderate	0.0-0.5	0.32	0.37			
BkA:												
Bixler	0-10	5-15	1.25-1.40	6.00-20.00	0.10-0.12	Low	0.5-3.0	0.17	0.17	5	2	134
	10-28	5-15	1.25-1.40	6.00-20.00	0.06-0.12	Low	0.0-0.5	0.15	0.15			
	28-36	5-25	1.30-1.45	0.60-2.00	0.12-0.18	Low	0.0-0.5	0.37	0.37			
	36-74	5-32	1.45-1.75	0.60-2.00	0.08-0.18	Moderate	0.0-0.5	0.37	0.37			
	74-80	35-55	1.50-1.70	0.01-0.20	0.08-0.12	High	0.0-0.5	0.28	0.28			
BrB2:												
Broughton	0-6	27-40	1.35-1.55	0.20-2.00	0.13-0.16	Moderate	1.0-3.0	0.43	0.43	5	7	38
	6-17	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	17-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
BrC2:												
Broughton	0-8	27-40	1.35-1.55	0.20-2.00	0.13-0.16	Moderate	1.0-3.0	0.43	0.43	5	7	38
	8-18	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	18-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
BrD2:												
Broughton	0-6	27-40	1.35-1.55	0.20-2.00	0.13-0.16	Moderate	1.0-3.0	0.43	0.43	5	7	38
	6-16	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	16-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
BrE2:												
Broughton	0-8	27-40	1.35-1.55	0.20-2.00	0.13-0.16	Moderate	1.0-3.0	0.43	0.43	5	7	38
	8-22	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	22-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
BsC3:												
Broughton	0-5	40-55	1.20-1.45	0.20-0.60	0.12-0.14	High	0.5-2.0	0.32	0.32	5	4	86
	5-12	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	12-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
BsD3:												
Broughton	0-5	40-55	1.20-1.45	0.20-0.60	0.12-0.14	High	0.5-2.0	0.32	0.32	5	4	86
	5-11	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	11-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
Db:												
Defiance	0-8	27-40	1.25-1.55	0.20-0.60	0.21-0.23	Moderate	2.0-3.0	0.37	0.37	5	7	38
	8-48	35-50	1.35-1.55	0.06-0.20	0.11-0.16	High	0.5-1.0	0.37	0.37			
	48-80	40-55	1.35-1.65	0.06-0.20	0.10-0.13	High	0.1-0.5	0.37	0.37			
Dc:												
Defiance	0-8	27-40	1.25-1.55	0.20-0.60	0.21-0.23	Moderate	2.0-3.0	0.37	0.37	5	7	38
	8-34	35-50	1.35-1.55	0.06-0.20	0.11-0.16	High	0.5-1.0	0.37	0.37			
	34-80	40-55	1.35-1.65	0.06-0.20	0.10-0.13	High	0.1-0.5	0.37	0.37			
Fb:												
Flatrock	0-10	18-27	1.20-1.50	0.60-2.00	0.20-0.24	Low	1.0-3.0	0.37	0.37	5	6	48
	10-38	18-27	1.25-1.60	0.60-2.00	0.17-0.22	Low	0.0-1.0	0.37	0.37			
	38-80	15-27	1.20-1.60	0.60-6.00	0.12-0.18	Low	0.0-1.0	0.28	0.28			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
Fc:												
Flatrock--------	0-13	18-27	1.20-1.50	0.60-2.00	0.20-0.24	Low------	1.0-3.0	0.37	0.37	5	6	48
	13-44	18-27	1.25-1.60	0.60-2.00	0.17-0.22	Low------	0.0-1.0	0.37	0.37			
	44-80	15-27	1.20-1.60	0.60-6.00	0.12-0.18	Low------	0.0-1.0	0.28	0.28			
FtA:												
Fulton----------	0-10	16-27	1.30-1.50	0.60-2.00	0.20-0.24	Low------	2.0-3.0	0.43	0.43	5	6	48
	10-37	45-60	1.40-1.65	0.06-0.20	0.09-0.13	High-----	0.5-1.0	0.32	0.32			
	37-80	35-50	1.45-1.65	0.01-0.20	0.08-0.12	High-----	0.1-0.3	0.32	0.32			
FuA:												
Fulton----------	0-10	27-40	1.35-1.55	0.20-0.60	0.21-0.23	Moderate	2.0-3.0	0.43	0.43	5	7	38
	10-38	45-60	1.40-1.65	0.06-0.20	0.09-0.13	High-----	0.5-1.0	0.32	0.32			
	38-80	35-50	1.45-1.65	0.01-0.20	0.08-0.12	High-----	0.1-0.3	0.32	0.32			
FuB2:												
Fulton----------	0-7	27-40	1.35-1.55	0.20-0.60	0.21-0.23	Moderate	2.0-3.0	0.43	0.43	5	7	38
	7-31	45-60	1.40-1.65	0.06-0.20	0.09-0.13	High-----	0.5-1.0	0.32	0.32			
	31-80	35-50	1.45-1.65	0.01-0.20	0.08-0.12	High-----	0.1-0.3	0.32	0.32			
FxA:												
Fulton----------	0-9	27-40	1.35-1.55	0.20-0.60	0.16-0.19	Moderate	2.0-3.0	0.43	0.43	5	7	38
	9-44	35-60	1.40-1.55	0.06-0.20	0.09-0.13	High-----	0.0-0.5	0.32	0.32			
	44-80	18-35	1.35-1.60	0.60-2.00	0.14-0.20	Moderate	0.0-0.5	0.37	0.37			
FxB:												
Fulton----------	0-8	27-40	1.35-1.55	0.20-0.60	0.16-0.19	Moderate	2.0-3.0	0.43	0.43	5	7	38
	8-51	35-60	1.40-1.55	0.06-0.20	0.09-0.13	High-----	0.0-0.5	0.32	0.32			
	51-80	18-35	1.35-1.60	0.60-2.00	0.14-0.20	Moderate	0.0-0.5	0.37	0.37			
Gr:												
Granby----------	0-13	2-14	1.20-1.60	6.00-20.00	0.10-0.12	Low------	3.0-6.0	0.17	0.17	4	2	134
	13-37	0-14	1.45-1.65	6.00-20.00	0.05-0.12	Low------	0.5-1.0	0.15	0.15			
	37-59	0-10	1.45-1.65	6.00-20.00	0.05-0.09	Low------	0.5-1.0	0.15	0.15			
	59-80	35-60	1.45-1.70	0.01-0.20	0.08-0.12	High-----	0.0-0.5	0.32	0.32			
HaA:												
Haskins---------	0-15	3-15	1.40-1.60	2.00-20.00	0.07-0.12	Low------	1.0-3.0	0.17	0.17	4	2	134
	15-34	18-35	1.45-1.70	0.60-2.00	0.12-0.16	Moderate	0.0-0.5	0.37	0.43			
	34-80	35-55	1.60-1.80	0.01-0.20	0.06-0.10	High-----	0.0-0.5	0.37	0.37			
HkA:												
Haskins---------	0-9	12-20	1.30-1.45	0.60-2.00	0.18-0.22	Low------	1.0-3.0	0.37	0.37	4	5	56
	9-35	18-35	1.45-1.70	0.60-2.00	0.12-0.16	Moderate	0.0-0.5	0.37	0.43			
	35-80	35-55	1.60-1.80	0.01-0.20	0.06-0.10	High-----	0.0-0.5	0.37	0.37			
HkB:												
Haskins---------	0-9	12-20	1.30-1.45	0.60-2.00	0.18-0.22	Low------	1.0-3.0	0.37	0.37	4	5	56
	9-30	18-35	1.45-1.70	0.60-2.00	0.12-0.16	Moderate	0.0-0.5	0.37	0.43			
	30-80	35-55	1.60-1.80	0.01-0.20	0.06-0.10	High-----	0.0-0.5	0.37	0.37			
Hs:												
Hoytville-------	0-9	27-40	1.25-1.50	0.20-2.00	0.19-0.23	Moderate	3.0-6.0	0.28	0.28	5	7	38
	9-39	40-55	1.35-1.60	0.20-0.60	0.08-0.13	High-----	0.5-1.0	0.28	0.32			
	39-80	35-50	1.40-1.75	0.06-0.20	0.06-0.10	High-----	0.2-0.5	0.28	0.32			
Ht:												
Hoytville-------	0-9	40-48	1.30-1.55	0.20-0.60	0.10-0.14	High-----	3.0-6.0	0.28	0.28	5	4	86
	9-39	40-55	1.40-1.80	0.20-0.60	0.08-0.13	High-----	0.5-1.0	0.28	0.32			
	39-80	35-50	1.40-1.75	0.06-0.20	0.06-0.10	High-----	0.2-0.5	0.28	0.32			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
Kn:												
Knoxdale	0-9	18-27	1.20-1.50	0.60-2.00	0.20-0.24	Low	1.0-3.0	0.37	0.37	5	6	48
	9-35	18-27	1.25-1.60	0.60-2.00	0.17-0.22	Low	0.0-1.0	0.37	0.37			
	35-80	15-27	1.20-1.60	0.60-6.00	0.12-0.18	Low	0.0-1.0	0.28	0.28			
La:												
Landes	0-18	10-22	1.20-1.40	0.60-6.00	0.20-0.22	Low	1.0-2.0	0.32	0.32	4	5	56
	18-26	5-18	1.60-1.70	2.00-6.00	0.10-0.15	Low	0.0-2.0	0.32	0.32			
	26-80	5-18	1.60-1.70	6.00-20.00	0.05-0.15	Low	0.0-2.0	0.20	0.20			
Lb:												
Latty	0-7	35-40	1.30-1.45	0.20-0.60	0.18-0.20	Moderate	3.0-5.0	0.28	0.28	5	4	86
	7-45	45-60	1.35-1.65	0.06-0.20	0.09-0.13	High	0.5-1.0	0.28	0.28			
	45-80	35-45	1.50-1.70	0.01-0.06	0.06-0.12	High	0.1-0.5	0.28	0.28			
Lc:												
Latty	0-11	40-55	1.30-1.50	0.06-0.20	0.11-0.14	High	3.0-5.0	0.28	0.28	5	4	86
	11-42	45-60	1.35-1.65	0.06-0.20	0.09-0.13	High	0.5-1.0	0.28	0.28			
	42-80	35-45	1.50-1.70	0.01-0.06	0.06-0.12	High	0.1-0.5	0.28	0.28			
LtA:												
Lucas	0-9	20-27	1.30-1.50	0.60-2.00	0.22-0.24	Low	1.0-3.0	0.43	0.43	5	6	48
	9-28	45-60	1.35-1.60	0.06-0.20	0.08-0.14	High	0.0-0.5	0.32	0.32			
	28-48	45-60	1.35-1.60	0.06-0.20	0.08-0.14	High	0.0-0.5	0.32	0.32			
	48-80	15-35	1.30-1.60	0.20-2.00	0.14-0.20	Moderate	0.0-0.5	0.28	0.28			
LuB2:												
Lucas	0-7	27-40	1.35-1.55	0.20-0.60	0.16-0.19	Moderate	1.0-3.0	0.43	0.43	5	7	38
	7-25	45-60	1.35-1.60	0.06-0.20	0.08-0.14	High	0.0-0.5	0.32	0.32			
	25-44	45-60	1.35-1.60	0.06-0.20	0.08-0.14	High	0.0-0.5	0.32	0.32			
	44-80	15-35	1.30-1.60	0.20-2.00	0.14-0.20	Moderate	0.0-0.5	0.28	0.28			
LuC2:												
Lucas	0-7	27-40	1.35-1.55	0.20-0.60	0.16-0.19	Moderate	1.0-3.0	0.43	0.43	5	7	38
	7-17	45-60	1.35-1.60	0.06-0.20	0.08-0.14	High	0.0-0.5	0.32	0.32			
	17-36	45-60	1.35-1.60	0.06-0.20	0.08-0.14	High	0.0-0.5	0.32	0.32			
	36-80	15-35	1.30-1.60	0.20-2.00	0.14-0.20	Moderate	0.0-0.5	0.28	0.28			
Md:												
Medway	0-19	18-27	1.20-1.45	0.60-2.00	0.20-0.24	Low	3.0-6.0	0.28	0.28	5	6	48
	19-41	18-32	1.20-1.50	0.60-2.00	0.14-0.18	Low	0.5-1.0	0.32	0.37			
	41-58	5-30	1.20-1.60	0.60-6.00	0.11-0.15	Low	0.5-1.0	0.32	0.37			
	58-80	5-30	1.20-1.60	0.60-6.00	0.08-0.15	Low	0.3-0.5	0.32	0.49			
Me:												
Mermill	0-9	14-27	1.25-1.50	0.60-2.00	0.18-0.24	Low	3.0-6.0	0.32	0.32	4	6	48
	9-37	18-35	1.50-1.70	0.60-2.00	0.12-0.16	Moderate	0.5-1.0	0.28	0.32			
	37-80	35-55	1.60-1.75	0.01-0.20	0.06-0.10	High	0.2-0.5	0.28	0.28			
Mg:												
Millgrove	0-15	15-27	1.30-1.50	0.60-2.00	0.18-0.22	Low	3.0-8.0	0.24	0.28	4	6	48
	15-36	18-35	1.40-1.70	0.60-2.00	0.12-0.16	Moderate	0.0-0.5	0.28	0.32			
	36-50	15-30	1.25-1.60	0.60-2.00	0.08-0.15	Low	0.0-0.5	0.20	0.43			
	50-61	5-18	1.25-1.60	2.00-6.00	0.08-0.12	Low	0.0-0.5	0.28	0.55			
	61-80	27-42	1.40-1.75	0.06-0.20	0.05-0.10	Moderate	0.0-0.5	0.32	0.37			
NnA:												
Nappanee	0-10	20-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	1.0-3.0	0.37	0.37	3	6	48
	10-27	45-60	1.40-1.65	0.06-0.20	0.08-0.14	High	0.5-1.0	0.37	0.37			
	27-80	35-50	1.50-1.75	0.06-0.20	0.06-0.12	High	0.0-0.5	0.37	0.37			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
NpA:												
Nappanee--------	0-10	32-40	1.30-1.50	0.20-0.60	0.18-0.22	Moderate	1.0-3.0	0.43	0.43	5	4	86
	10-27	45-60	1.40-1.65	0.06-0.20	0.08-0.14	High-----	0.5-1.0	0.37	0.37			
	27-80	35-50	1.50-1.75	0.06-0.20	0.06-0.12	High-----	0.0-0.5	0.37	0.37			
NpB:												
Nappanee--------	0-10	32-40	1.30-1.50	0.20-0.60	0.18-0.22	Moderate	1.0-3.0	0.43	0.43	5	4	86
	10-28	45-60	1.40-1.65	0.06-0.20	0.08-0.14	High-----	0.5-1.0	0.37	0.37			
	28-80	35-50	1.50-1.75	0.06-0.20	0.06-0.12	High-----	0.0-0.5	0.37	0.37			
NpB2:												
Nappanee--------	0-10	32-40	1.30-1.50	0.20-0.60	0.18-0.22	Moderate	1.0-3.0	0.43	0.43	5	4	86
	10-28	45-60	1.40-1.65	0.06-0.20	0.08-0.14	High-----	0.5-1.0	0.37	0.37			
	28-80	35-50	1.50-1.75	0.06-0.20	0.06-0.12	High-----	0.0-0.5	0.37	0.37			
OsB:												
Oshtemo---------	0-8	5-15	1.15-1.60	2.00-6.00	0.12-0.15	Low------	0.5-3.0	0.24	0.24	5	3	86
	8-42	10-22	1.25-1.60	2.00-6.00	0.11-0.20	Low------	0.0-0.5	0.24	0.24			
	42-68	5-15	1.20-1.60	2.00-6.00	0.08-0.10	Low------	0.0-0.5	0.17	0.17			
	68-74	5-15	1.20-1.50	>20.00	0.02-0.04	Low------	0.0-0.5	0.10	0.10			
	74-80	27-42	1.40-1.75	0.06-0.20	0.05-0.10	Moderate	0.0-0.5	0.32	0.37			
OtB:												
Ottokee---------	0-10	2-10	1.40-1.60	6.00-20.00	0.09-0.12	Low------	0.5-2.0	0.17	0.17	5	2	134
	10-60	1-12	1.50-1.70	6.00-20.00	0.06-0.10	Low------	0.3-1.0	0.17	0.17			
	60-80	1-8	1.50-1.70	6.00-20.00	0.03-0.06	Low------	0.1-0.3	0.17	0.17			
Pc:												
Paulding--------	0-6	40-65	1.20-1.40	0.06-0.20	0.11-0.14	High-----	3.0-5.0	0.28	0.28	5	4	86
	6-48	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High-----	0.5-1.0	0.28	0.28			
	48-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High-----	0.1-0.5	0.28	0.28			
Pt:												
Pits, quarry.												
RkA:												
Rimer-----------	0-9	3-15	1.40-1.60	6.00-20.00	0.08-0.14	Low------	1.0-3.0	0.17	0.17	3	2	134
	9-23	5-15	1.40-1.70	6.00-20.00	0.06-0.12	Low------	0.3-1.0	0.17	0.17			
	23-33	7-18	1.50-1.70	2.00-6.00	0.12-0.17	Low------	0.2-0.5	0.17	0.17			
	33-80	35-55	1.50-1.80	0.01-0.20	0.06-0.12	High-----	0.1-0.3	0.32	0.32			
RkB:												
Rimer-----------	0-10	3-15	1.40-1.60	6.00-20.00	0.08-0.14	Low------	1.0-3.0	0.17	0.17	3	2	134
	10-21	5-15	1.40-1.70	6.00-20.00	0.06-0.12	Low------	0.3-1.0	0.17	0.17			
	21-27	7-18	1.50-1.70	2.00-6.00	0.12-0.17	Low------	0.2-0.5	0.17	0.17			
	27-80	35-55	1.50-1.80	0.01-0.20	0.06-0.12	High-----	0.1-0.3	0.32	0.32			
RmA:												
Rimer-----------	0-8	3-15	1.40-1.60	6.00-20.00	0.08-0.14	Low------	1.0-3.0	0.17	0.17	3	2	134
	8-21	5-15	1.40-1.70	6.00-20.00	0.06-0.12	Low------	0.3-1.0	0.17	0.17			
	21-38	7-18	1.50-1.70	2.00-6.00	0.12-0.17	Low------	0.2-0.5	0.17	0.17			
	38-80	35-55	1.50-1.80	0.01-0.20	0.06-0.12	High-----	0.1-0.3	0.32	0.32			
Fulton----------	0-8	16-27	1.30-1.50	0.60-2.00	0.20-0.24	Low------	2.0-3.0	0.43	0.43	5	6	48
	8-33	45-60	1.40-1.65	0.06-0.20	0.09-0.13	High-----	0.5-1.0	0.32	0.32			
	33-80	35-50	1.45-1.65	0.01-0.20	0.08-0.12	High-----	0.1-0.3	0.32	0.32			
RnA:												
Roselms---------	0-9	15-27	1.30-1.60	0.60-2.00	0.16-0.24	Low------	2.0-3.0	0.43	0.49	3	6	48
	9-29	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High-----	0.5-1.0	0.28	0.28			
	29-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High-----	0.1-0.5	0.28	0.28			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
RoA:												
Roselms	0-8	27-40	1.30-1.60	0.06-0.60	0.19-0.23	Moderate	2.0-3.0	0.43	0.43	5	7	38
	8-23	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	23-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
RoB:												
Roselms	0-9	27-40	1.30-1.60	0.06-0.60	0.19-0.23	Moderate	2.0-3.0	0.43	0.43	5	7	38
	9-16	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	16-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
RpA:												
Roselms	0-8	40-50	1.20-1.55	0.06-0.20	0.10-0.14	High	2.0-3.0	0.32	0.32	5	4	86
	8-34	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	34-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
RpB2:												
Roselms	0-6	40-50	1.20-1.55	0.06-0.20	0.10-0.14	High	2.0-3.0	0.32	0.32	5	4	86
	6-26	60-80	1.35-1.60	0.01-0.06	0.08-0.11	High	0.5-1.0	0.28	0.28			
	26-80	60-80	1.40-1.60	0.01-0.06	0.04-0.06	High	0.1-0.5	0.28	0.28			
Rt:												
Rossburg	0-15	13-27	1.20-1.50	0.60-2.00	0.19-0.24	Low	4.0-8.0	0.37	0.37	5	6	48
	15-48	18-27	1.25-1.60	0.60-2.00	0.15-0.22	Low	0.5-2.0	0.37	0.37			
	48-80	5-15	1.30-1.60	2.00-20.00	0.05-0.15	Low	0.1-0.5	0.24	0.28			
Sb:												
Saranac	0-11	27-40	1.30-1.50	0.20-0.60	0.20-0.24	Moderate	4.0-6.0	0.28	0.28	5	7	38
	11-46	35-60	1.40-1.70	0.20-0.60	0.10-0.20	High	0.5-1.0	0.32	0.32			
	46-80	35-60	1.50-1.75	0.20-0.60	0.10-0.20	High	0.1-0.5	0.32	0.32			
Sh:												
Shoals	0-8	18-27	1.30-1.50	0.60-2.00	0.22-0.24	Low	2.0-5.0	0.37	0.37	5	6	48
	8-44	18-33	1.35-1.55	0.60-2.00	0.17-0.22	Moderate	0.5-2.0	0.37	0.37			
	44-80	12-25	1.35-1.60	0.60-2.00	0.12-0.21	Low	0.5-1.0	0.37	0.43			
Sk:												
Shoals	0-8	18-27	1.30-1.50	0.60-2.00	0.22-0.24	Low	2.0-5.0	0.37	0.37	5	6	48
	8-44	18-33	1.35-1.55	0.60-2.00	0.17-0.22	Moderate	0.5-2.0	0.37	0.37			
	44-80	12-25	1.35-1.60	0.60-2.00	0.12-0.21	Low	0.5-1.0	0.37	0.43			
StB2:												
St. Clair	0-8	27-40	1.50-1.60	0.20-0.60	0.17-0.23	Moderate	1.0-3.0	0.43	0.43	5	7	38
	8-25	40-55	1.35-1.70	0.06-0.20	0.10-0.12	High	0.0-0.5	0.37	0.37			
	25-80	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	0.0-0.5	0.37	0.37			
StC2:												
St. Clair	0-6	27-40	1.50-1.60	0.20-0.60	0.17-0.23	Moderate	1.0-3.0	0.43	0.43	5	7	38
	6-22	40-55	1.35-1.70	0.06-0.20	0.10-0.12	High	0.0-0.5	0.37	0.37			
	22-80	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	0.0-0.5	0.37	0.37			
StD2:												
St. Clair	0-7	27-40	1.50-1.60	0.20-0.60	0.17-0.23	Moderate	1.0-3.0	0.43	0.43	5	7	38
	7-21	40-55	1.35-1.70	0.06-0.20	0.10-0.12	High	0.0-0.5	0.37	0.37			
	21-80	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	0.0-0.5	0.37	0.37			
StE2:												
St. Clair	0-3	27-40	1.50-1.60	0.20-0.60	0.17-0.23	Moderate	1.0-3.0	0.43	0.43	5	7	38
	3-28	40-55	1.35-1.70	0.06-0.20	0.10-0.12	High	0.0-0.5	0.37	0.37			
	28-80	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	0.0-0.5	0.37	0.37			

Table 19.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								K	Kf	T		
	In	Pct	g/cc	In/hr	In/in		Pct					
SuC3:												
St. Clair-------	0-8	40-50	1.35-1.50	0.06-0.20	0.11-0.14	High-----	0.5-1.0	0.32	0.32	5	4	86
	8-12	40-55	1.35-1.70	0.06-0.20	0.10-0.12	High-----	0.0-0.5	0.37	0.37			
	12-80	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High-----	0.0-0.5	0.37	0.37			
SuE3:												
St. Clair-------	0-6	40-50	1.35-1.50	0.06-0.20	0.11-0.14	High-----	0.5-1.0	0.32	0.32	5	4	86
	6-9	40-55	1.35-1.70	0.06-0.20	0.10-0.12	High-----	0.0-0.5	0.37	0.37			
	9-80	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High-----	0.0-0.5	0.37	0.37			
TeA:												
Tedrow----------	0-12	2-10	1.40-1.60	6.00-20.00	0.08-0.12	Low------	1.0-3.0	0.17	0.17	5	2	134
	12-44	2-8	1.50-1.70	6.00-20.00	0.07-0.11	Low------	0.1-0.5	0.17	0.17			
	44-80	1-8	1.50-1.70	6.00-20.00	0.05-0.07	Low------	0.1-0.3	0.17	0.17			
Tn:												
Toledo----------	0-9	27-40	1.40-1.60	0.20-0.60	0.17-0.23	Moderate	3.0-6.0	0.28	0.28	5	7	38
	9-43	40-60	1.40-1.70	0.06-0.20	0.09-0.13	High-----	0.5-1.0	0.28	0.28			
	43-80	35-60	1.45-1.75	0.06-0.20	0.08-0.12	High-----	0.1-0.5	0.28	0.28			
To:												
Toledo----------	0-9	40-55	1.45-1.65	0.20-0.60	0.12-0.14	High-----	3.0-6.0	0.28	0.28	5	4	86
	9-43	40-60	1.40-1.70	0.06-0.20	0.09-0.13	High-----	0.5-1.0	0.28	0.28			
	43-80	35-60	1.45-1.75	0.06-0.20	0.08-0.12	High-----	0.1-0.5	0.28	0.28			
Uc:												
Udorthents.												
Wb:												
Wabasha---------	0-9	35-40	1.35-1.55	0.20-0.60	0.16-0.20	Moderate	3.0-6.0	0.32	0.32	4	4	86
	9-52	40-55	1.35-1.65	0.06-0.20	0.12-0.16	High-----	0.5-1.0	0.32	0.32			
	52-80	35-55	1.50-1.65	0.06-0.20	0.12-0.17	High-----	0.1-0.5	0.32	0.32			
WhA:												
Whitaker--------	0-13	8-19	1.30-1.45	0.60-2.00	0.20-0.24	Low------	1.0-3.0	0.37	0.37	5	5	56
	13-44	18-33	1.40-1.60	0.60-2.00	0.15-0.19	Moderate	0.5-1.0	0.37	0.37			
	44-60	3-18	1.50-1.70	0.60-6.00	0.19-0.21	Low------	0.0-1.0	0.37	0.37			

Table 20.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	pH	Pct
BeB:					
Belmore	0-6	10-24	5.0-17.0	5.6-7.3	---
	6-39	15-30	6.0-18.0	4.5-7.3	---
	39-75	5-15	2.0-9.0	7.4-8.4	10-30
	75-80	27-42	14.0-30.0	7.4-8.4	15-30
BkA:					
Bixler	0-10	5-15	2.0-15.0	5.1-7.3	---
	10-28	5-15	2.0-9.0	5.6-7.3	---
	28-36	5-25	2.0-15.0	5.6-7.3	---
	36-74	5-32	2.0-19.0	6.1-8.4	0-15
	74-80	35-55	14.0-33.0	7.4-8.4	10-30
BrB2:					
Broughton	0-6	27-40	13.0-30.0	4.5-7.3	---
	6-17	60-80	24.0-50.0	5.6-7.8	0-15
	17-80	60-80	24.0-48.0	7.4-8.4	15-25
BrC2:					
Broughton	0-8	27-40	13.0-30.0	4.5-7.3	---
	8-18	60-80	24.0-50.0	5.6-7.8	0-15
	18-80	60-80	24.0-48.0	7.4-8.4	15-25
BrD2:					
Broughton	0-6	27-40	13.0-30.0	4.5-7.3	---
	6-16	60-80	24.0-50.0	5.6-7.8	0-15
	16-80	60-80	24.0-48.0	7.4-8.4	15-25
BrE2:					
Broughton	0-8	27-40	13.0-30.0	4.5-7.3	---
	8-22	60-80	24.0-50.0	5.6-7.8	0-15
	22-80	60-80	24.0-48.0	7.4-8.4	15-25
BsC3:					
Broughton	0-5	40-55	17.0-37.0	5.1-7.3	---
	5-12	60-80	24.0-50.0	5.6-7.8	0-15
	12-80	60-80	24.0-48.0	7.4-8.4	15-25
BsD3:					
Broughton	0-5	40-55	17.0-37.0	5.1-7.3	---
	5-11	60-80	24.0-50.0	5.6-7.8	0-15
	11-80	60-80	24.0-48.0	7.4-8.4	15-25
Db:					
Defiance	0-8	27-40	15.0-30.0	6.1-7.8	---
	8-48	35-50	14.0-30.0	5.6-7.8	---
	48-80	40-55	16.0-33.0	6.6-7.8	0-10
Dc:					
Defiance	0-8	27-40	15.0-30.0	6.1-7.8	---
	8-34	35-50	14.0-30.0	5.6-7.8	---
	34-80	40-55	16.0-33.0	6.6-7.8	0-10
Fb:					
Flatrock	0-10	18-27	9.0-20.0	5.6-7.3	---
	10-38	18-27	7.0-17.0	6.1-7.8	0-5
	38-80	15-27	6.0-17.0	6.6-8.4	0-20

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	pH	Pct
Fc:					
Flatrock	0-13	18-27	9.0-20.0	5.6-7.3	---
	13-44	18-27	7.0-17.0	6.1-7.8	0-5
	44-80	15-27	6.0-17.0	6.6-8.4	0-20
FtA:					
Fulton	0-10	16-27	14.0-24.0	5.1-7.3	---
	10-37	45-60	22.0-36.0	5.1-7.3	---
	37-80	35-50	14.0-30.0	7.4-8.4	10-30
FuA:					
Fulton	0-10	27-40	15.0-30.0	5.1-7.3	---
	10-38	45-60	22.0-36.0	5.1-7.3	---
	38-80	35-50	14.0-30.0	7.4-8.4	10-30
FuB2:					
Fulton	0-7	27-40	15.0-30.0	5.1-7.3	---
	7-31	45-60	22.0-36.0	5.1-7.3	---
	31-80	35-50	14.0-30.0	7.4-8.4	10-30
FxA:					
Fulton	0-9	27-40	15.0-30.0	5.1-7.3	---
	9-44	35-59	14.0-36.0	5.1-7.8	0-10
	44-80	18-35	7.0-21.0	6.6-8.4	10-30
FxB:					
Fulton	0-8	27-40	15.0-30.0	5.1-7.3	---
	8-51	35-59	14.0-36.0	5.1-7.8	0-10
	51-80	18-35	7.0-21.0	6.6-8.4	10-30
Gr:					
Granby	0-13	2-14	10.0-15.0	5.1-7.3	---
	13-37	0-14	2.0-10.0	5.6-7.3	---
	37-59	0-10	1.0-4.0	6.6-8.4	5-15
	59-80	35-60	14.0-36.0	7.4-8.4	15-25
HaA:					
Haskins	0-15	3-15	2.0-15.0	4.5-7.3	---
	15-34	18-35	7.0-21.0	5.1-7.3	---
	34-80	35-55	14.0-33.0	6.1-8.4	0-30
HkA:					
Haskins	0-9	12-20	6.0-15.0	4.5-7.3	---
	9-35	18-35	7.0-21.0	5.1-7.3	---
	35-80	35-55	14.0-33.0	6.1-8.4	0-30
HkB:					
Haskins	0-9	12-20	6.0-15.0	4.5-7.3	---
	9-30	18-35	7.0-21.0	5.1-7.3	---
	30-80	35-55	14.0-33.0	6.1-8.4	0-30
Hs:					
Hoytville	0-9	27-40	17.0-35.0	6.1-7.3	---
	9-39	40-55	16.0-32.0	6.1-7.8	0-15
	39-80	35-50	14.0-30.0	7.4-8.4	15-25
Ht:					
Hoytville	0-9	40-48	24.0-40.0	6.1-7.3	---
	9-39	40-55	16.0-32.0	6.1-7.8	0-15
	39-80	35-50	14.0-30.0	7.4-8.4	15-25

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	pH	Pct
Kn:					
Knoxdale	0-9	18-27	9.0-20.0	6.1-7.3	---
	9-35	18-27	7.0-17.0	6.1-7.8	0-5
	35-80	15-27	6.0-17.0	6.6-8.4	0-20
La:					
Landes	0-18	10-22	8.0-17.0	5.6-8.4	---
	18-26	5-18	3.0-13.0	5.6-8.4	0-10
	26-80	5-18	3.0-13.0	5.6-8.4	0-20
Lb:					
Latty	0-7	35-40	20.0-34.0	6.1-7.8	---
	7-45	45-60	20.0-38.0	6.1-7.8	0-5
	45-80	35-45	14.0-27.0	7.4-8.4	10-25
Lc:					
Latty	0-11	40-55	22.0-40.0	6.1-7.8	---
	11-42	45-60	20.0-38.0	6.1-7.8	0-5
	42-80	35-45	14.0-27.0	7.4-8.4	10-25
LtA:					
Lucas	0-9	20-27	9.0-19.0	5.1-7.3	---
	9-28	45-60	18.0-36.0	5.1-6.5	---
	28-48	45-60	18.0-36.0	6.1-7.3	---
	48-80	15-35	6.0-21.0	6.1-8.4	0-30
LuB2:					
Lucas	0-7	27-40	12.0-27.0	5.1-7.3	---
	7-25	45-60	18.0-36.0	5.1-6.5	---
	25-44	45-60	18.0-36.0	6.1-7.3	---
	44-80	15-35	6.0-21.0	6.1-8.4	0-30
LuC2:					
Lucas	0-7	27-40	12.0-27.0	5.1-7.3	---
	7-17	45-60	18.0-36.0	5.1-6.5	---
	17-36	45-60	18.0-36.0	6.1-7.3	---
	36-80	15-35	6.0-21.0	6.1-8.4	0-30
Md:					
Medway	0-19	18-27	13.0-28.0	6.1-7.8	---
	19-41	18-32	7.0-17.0	6.1-8.4	---
	41-58	5-30	4.0-18.0	6.1-8.4	0-10
	58-80	5-30	2.0-18.0	6.1-8.4	0-20
Me:					
Mermill	0-9	14-27	13.0-26.0	5.6-7.3	---
	9-37	18-35	7.0-21.0	5.6-7.8	---
	37-80	35-55	14.0-33.0	6.6-8.4	0-30
Mg:					
Millgrove	0-15	15-27	12.0-32.0	5.6-7.3	---
	15-36	18-35	7.0-21.0	5.6-7.8	0-20
	36-50	15-30	6.0-18.0	6.1-7.8	0-20
	50-61	5-18	2.0-9.0	7.4-8.4	10-30
	61-80	27-42	14.0-30.0	7.4-8.4	15-30
NnA:					
Nappanee	0-10	20-27	10.0-22.0	5.1-7.3	---
	10-27	45-60	18.0-38.0	5.1-7.8	---
	27-80	35-50	14.0-30.0	7.4-8.4	10-20

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	pH	Pct
NpA:					
Nappanee	0-10	32-40	14.0-30.0	5.1-7.3	---
	10-27	45-60	18.0-38.0	5.1-7.8	---
	27-80	35-50	14.0-30.0	7.4-8.4	10-20
NpB:					
Nappanee	0-10	32-40	14.0-30.0	5.1-7.3	---
	10-28	45-60	18.0-38.0	5.1-7.8	---
	28-80	35-50	14.0-30.0	7.4-8.4	10-20
NpB2:					
Nappanee	0-10	32-40	14.0-30.0	5.1-7.3	---
	10-28	45-60	18.0-38.0	5.1-7.8	---
	28-80	35-50	14.0-30.0	7.4-8.4	10-20
OsB:					
Oshtemo	0-8	5-15	3.0-12.0	5.1-7.3	---
	8-42	10-22	4.0-15.0	5.1-6.5	---
	42-68	5-15	2.0-10.0	5.1-7.3	---
	68-74	5-15	2.0-10.0	7.4-8.4	10-20
	74-80	27-42	14.0-30.0	7.4-8.4	15-30
OtB:					
Ottokee	0-10	2-10	4.0-12.0	5.6-7.3	---
	10-60	1-12	1.0-6.0	5.6-7.3	---
	60-80	1-8	1.0-4.0	6.1-8.4	0-12
Pc:					
Paulding	0-6	40-65	22.0-50.0	5.6-7.3	---
	6-48	60-80	24.0-50.0	5.6-7.8	0-15
	48-80	60-80	24.0-48.0	7.4-8.4	15-25
Pt:					
Pits, quarry.					
RkA:					
Rimer	0-9	3-15	3.0-15.0	5.1-7.3	---
	9-23	5-15	2.0-9.0	5.1-7.3	---
	23-33	7-18	3.0-11.0	5.1-7.3	---
	33-80	35-55	14.0-33.0	6.1-8.4	0-30
RkB:					
Rimer	0-10	3-15	3.0-15.0	5.1-7.3	---
	10-21	5-15	2.0-9.0	5.1-7.3	---
	21-27	7-18	3.0-11.0	5.1-7.3	---
	27-80	35-55	14.0-33.0	6.1-8.4	0-30
RmA:					
Rimer	0-8	3-15	3.0-15.0	5.1-7.3	---
	8-21	5-15	2.0-9.0	5.1-7.3	---
	21-38	7-18	3.0-11.0	5.1-7.3	---
	38-80	35-55	14.0-33.0	6.1-8.4	0-30
Fulton	0-8	16-27	14.0-24.0	5.1-7.3	---
	8-33	45-60	22.0-36.0	5.1-7.3	---
	33-80	35-50	14.0-30.0	7.4-8.4	10-30
RnA:					
Roselms	0-9	15-27	10.0-20.0	4.5-7.3	---
	9-29	60-80	24.0-50.0	4.5-7.8	0-15
	29-80	60-80	24.0-48.0	7.4-8.4	15-25

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	pH	Pct
RoA:					
Roselms	0-8	27-40	17.0-26.0	4.5-7.3	---
	8-23	60-80	24.0-50.0	4.5-7.8	0-15
	23-80	60-80	24.0-48.0	7.4-8.4	15-25
RoB:					
Roselms	0-9	27-40	17.0-26.0	4.5-7.3	---
	9-16	60-80	24.0-50.0	4.5-7.8	0-15
	16-80	60-80	24.0-48.0	7.4-8.4	15-25
RpA:					
Roselms	0-8	40-50	20.0-32.0	4.5-7.3	---
	8-34	60-80	24.0-50.0	4.5-7.8	0-15
	34-80	60-80	24.0-48.0	7.4-8.4	15-25
RpB2:					
Roselms	0-6	40-50	20.0-32.0	4.5-7.3	---
	6-26	60-80	24.0-50.0	4.5-7.8	0-15
	26-80	60-80	24.0-48.0	7.4-8.4	15-25
Rt:					
Rossburg	0-15	13-27	13.0-32.0	6.1-7.8	---
	15-48	18-27	7.0-16.0	6.1-7.8	0-10
	48-80	5-15	2.0-9.0	6.6-8.4	10-30
Sb:					
Saranac	0-11	27-40	15.0-30.0	6.1-7.8	---
	11-46	35-60	10.0-38.0	6.1-7.8	---
	46-80	35-60	10.0-38.0	6.6-8.4	0-20
Sh:					
Shoals	0-8	18-27	12.0-27.0	6.1-7.8	0-5
	8-44	18-33	8.0-24.0	6.1-7.8	0-10
	44-80	12-25	5.0-17.0	6.1-8.4	0-25
Sk:					
Shoals	0-8	18-27	12.0-27.0	6.1-7.8	0-5
	8-44	18-33	8.0-24.0	6.1-7.8	0-10
	44-80	12-25	5.0-17.0	6.1-8.4	0-25
StB2:					
St. Clair	0-8	27-40	13.0-30.0	5.6-7.3	---
	8-25	40-55	16.0-34.0	5.6-7.3	---
	25-80	35-55	14.0-34.0	7.4-8.4	20-30
StC2:					
St. Clair	0-6	27-40	13.0-30.0	5.6-7.3	---
	6-22	40-55	16.0-34.0	5.6-7.3	---
	22-80	35-55	14.0-34.0	7.4-8.4	20-30
StD2:					
St. Clair	0-7	27-40	13.0-30.0	5.6-7.3	---
	7-21	40-55	16.0-34.0	5.6-7.3	---
	21-80	35-55	14.0-34.0	7.4-8.4	20-30
StE2:					
St. Clair	0-3	27-40	13.0-30.0	5.6-7.3	---
	3-28	40-55	16.0-34.0	5.6-7.3	---
	28-80	35-55	14.0-34.0	7.4-8.4	20-30

Table 20.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation-exchange capacity	Soil reaction	Calcium carbonate
	In	Pct	meq/100g	pH	Pct
SuC3:					
St. Clair-------	0-8	40-50	17.0-32.0	5.6-7.3	---
	8-12	40-55	16.0-34.0	5.6-7.3	---
	12-80	35-55	14.0-34.0	7.4-8.4	20-30
SuE3:					
St. Clair-------	0-6	40-50	17.0-32.0	5.6-7.3	---
	6-9	40-55	16.0-34.0	5.6-7.3	---
	9-80	35-55	14.0-34.0	7.4-8.4	20-30
TeA:					
Tedrow----------	0-12	2-10	5.0-14.0	6.1-7.3	---
	12-44	2-8	2.0-6.0	5.6-7.8	---
	44-80	1-8	1.0-4.0	6.6-8.4	0-10
Tn:					
Toledo----------	0-9	27-40	17.0-36.0	5.6-7.3	---
	9-43	40-60	16.0-36.0	6.1-7.8	---
	43-80	35-60	14.0-32.0	7.4-8.4	8-22
To:					
Toledo----------	0-9	40-55	22.0-45.0	5.6-7.3	---
	9-43	40-60	16.0-36.0	6.1-7.8	---
	43-80	35-60	14.0-32.0	7.4-8.4	8-22
Uc:					
Udorthents.					
Wb:					
Wabasha---------	0-9	35-40	20.0-36.0	6.1-7.8	---
	9-52	40-55	16.0-33.0	6.1-7.8	0-5
	52-80	35-55	14.0-33.0	6.1-8.4	0-15
WhA:					
Whitaker--------	0-13	8-19	5.0-18.0	5.6-7.3	---
	13-44	18-33	8.0-22.0	5.1-7.3	---
	44-60	3-18	1.0-13.0	6.1-8.4	0-30

Table 21.--Water 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	Hydrologic group	Flooding			High water table and ponding				Maximum ponding depth
		Frequency	Duration	Months	Water table depth	Kind of water table	Months	Ponding duration	
					Ft				Ft
BeB:									
Belmore	B	None	---	---	3.0-6.0	Perched	Nov-May	---	---
BkA:									
Bixler	C	None	---	---	1.5-3.0	Perched	Nov-May	---	---
BrB2:									
Broughton	D	None	---	---	1.5-3.0	Perched	Jan-Apr	---	---
BrC2:									
Broughton	D	None	---	---	1.5-3.0	Perched	Jan-Apr	---	---
BrD2:									
Broughton	D	None	---	---	1.5-3.0	Perched	Jan-Apr	---	---
BrE2:									
Broughton	D	None	---	---	1.5-3.0	Perched	Jan-Apr	---	---
BsC3:									
Broughton	D	None	---	---	1.5-3.0	Perched	Jan-Apr	---	---
BsD3:									
Broughton	D	None	---	---	1.5-3.0	Perched	Jan-Apr	---	---
Db:									
Defiance	D	Occasional	Brief	Jan-May	1.0-2.5	Apparent	Dec-May	---	---
Dc:									
Defiance	D	Frequent	Brief	Jan-May	1.0-2.5	Apparent	Dec-May	---	---
Fb:									
Flatrock	B	Occasional	Brief	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	---	---
Fc:									
Flatrock	B	Frequent	Brief	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	---	---
FtA:									
Fulton	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---
FuA:									
Fulton	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---
FuB2:									
Fulton	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---
FxA:									
Fulton	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---
FxB:									
Fulton	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---
Gr:									
Granby	A/D	None	---	---	0.0-1.0	Apparent	Nov-Jun	Brief	1.0
HaA:									
Haskins	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table and ponding				Maximum ponding depth
		Frequency	Duration	Months	Water table depth	Kind of water table	Months	Ponding duration	
					Ft				Ft
HkA:									
Haskins	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
HkB:									
Haskins	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
Hs:									
Hoytville	C/D	None	---	---	0.0-1.0	Perched	Jan-Apr	Very brief	1.0
Ht:									
Hoytville	C/D	None	---	---	0.0-1.0	Perched	Jan-Apr	Brief	1.0
Kn:									
Knoxdale	B	Occasional	Brief	Dec-Apr	3.0-6.0	Apparent	Dec-Apr	---	---
La:									
Landes	B	Occasional	Brief	Jan-Jun	>6.0	---	---	---	---
Lb:									
Latty	D	None	---	---	0.0-1.0	Perched	Jan-Apr	Very brief	0.5
Lc:									
Latty	D	None	---	---	0.0-1.0	Perched	Jan-Apr	Brief	0.5
LtA:									
Lucas	D	None	---	---	2.5-4.0	Perched	Jan-Apr	---	---
LuB2:									
Lucas	D	None	---	---	2.5-4.0	Perched	Jan-Apr	---	---
LuC2:									
Lucas	D	None	---	---	2.5-4.0	Perched	Jan-Apr	---	---
Md:									
Medway	B	Occasional	Brief	Nov-Jun	1.5-3.0	Apparent	Jan-Apr	---	---
Me:									
Mermill	B/D	None	---	---	0.0-1.0	Perched	Dec-May	Very brief	1.0
Mg:									
Millgrove	B/D	None	---	---	0.0-1.0	Perched	Nov-May	Very brief	1.0
NnA:									
Nappanee	D	None	---	---	1.0-2.0	Perched	Nov-May	---	---
NpA:									
Nappanee	D	None	---	---	1.0-2.0	Perched	Nov-May	---	---
NpB:									
Nappanee	D	None	---	---	1.0-2.0	Perched	Nov-May	---	---
NpB2:									
Nappanee	D	None	---	---	1.0-2.0	Perched	Nov-May	---	---
OsB:									
Oshtemo	B	None	---	---	3.0-6.0	Perched	Nov-May	---	---
OtB:									
Ottokee	A	None	---	---	2.0-3.5	Apparent	Jan-Apr	---	---
Pc:									
Paulding	D	None	---	---	0.0-0.5	Perched	Jan-Apr	Long	1.0

Table 21.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table and ponding				
		Frequency	Duration	Months	Water table depth	Kind of water table	Months	Ponding duration	Maximum ponding depth
					Ft				Ft
Pt:									
Pits, quarry.									
RkA:									
Rimer	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RkB:									
Rimer	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RmA:									
Rimer	C	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
Fulton	D	None	---	---	1.0-2.5	Perched	Dec-May	---	---
RnA:									
Roselms	D	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RoA:									
Roselms	D	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RoB:									
Roselms	D	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RpA:									
Roselms	D	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
RpB2:									
Roselms	D	None	---	---	1.0-2.5	Perched	Jan-Apr	---	---
Rt:									
Rossburg	B	Occasional	Very brief	Nov-Jun	>6.0	---	---	---	---
Sb:									
Saranac	C/D	Occasional	Long	Nov-Apr	0.0-1.0	Apparent	Oct-May	---	---
Sh:									
Shoals	C	Occasional	Brief	Oct-Jun	0.5-1.5	Apparent	Jan-Apr	---	---
Sk:									
Shoals	C	Frequent	Brief	Oct-Jun	0.5-1.5	Apparent	Jan-Apr	---	---
StB2:									
St. Clair	D	None	---	---	2.0-3.0	Perched	Mar-May	---	---
StC2:									
St. Clair	D	None	---	---	2.0-3.0	Perched	Mar-May	---	---
StD2:									
St. Clair	D	None	---	---	2.0-3.0	Perched	Mar-May	---	---
StE2:									
St. Clair	D	None	---	---	2.0-3.0	Perched	Mar-May	---	---
SuC3:									
St. Clair	D	None	---	---	2.0-3.0	Perched	Mar-May	---	---
SuE3:									
St. Clair	D	None	---	---	2.0-3.0	Perched	Mar-May	---	---
TeA:									
Tedrow	B	None	---	---	1.0-2.0	Apparent	Jan-Apr	---	---

Table 21.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table and ponding				Maximum ponding depth
		Frequency	Duration	Months	Water table depth	Kind of water table	Months	Ponding duration	
					Ft				Ft
Tn:									
Toledo	D	None	---	---	0.0-1.0	Apparent	Jan-Apr	Brief	1.0
To:									
Toledo	D	None	---	---	0.0-1.0	Apparent	Jan-Apr	Brief	1.0
Uc:									
Udorthents.									
Wb:									
Wabasha	D	Frequent	Long	Jan-May	0.0-1.0	Apparent	Dec-Jun	---	---
WhA:									
Whitaker	C	None	---	---	1.0-3.0	Apparent	Jan-Apr	---	---

Table 22.--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	Bedrock		Potential frost action	Risk of corrosion	
				Uncoated steel	Concrete
	In				
BeB:					
Belmore	>80	---	Low	Moderate	Moderate.
BkA:					
Bixler	>80	---	High	Moderate	Moderate.
BrB2:					
Broughton	>80	---	Moderate	High	Moderate.
BrC2:					
Broughton	>80	---	Moderate	High	Moderate.
BrD2:					
Broughton	>80	---	Moderate	High	Moderate.
BrE2:					
Broughton	>80	---	Moderate	High	Moderate.
BsC3:					
Broughton	>80	---	Moderate	High	Moderate.
BsD3:					
Broughton	>80	---	Moderate	High	Moderate.
Db:					
Defiance	>80	---	High	High	Moderate.
Dc:					
Defiance	>80	---	High	High	Moderate.
Fb:					
Flatrock	>80	---	Moderate	Moderate	Low.
Fc:					
Flatrock	>80	---	Moderate	Moderate	Low.
FtA:					
Fulton	>80	---	High	High	Moderate.
FuA:					
Fulton	>80	---	High	High	Moderate.
FuB2:					
Fulton	>80	---	High	High	Moderate.
FxA:					
Fulton	>80	---	High	High	Moderate.
FxB:					
Fulton	>80	---	High	High	Moderate.
Gr:					
Granby	>80	---	Moderate	High	Moderate.
HaA:					
Haskins	>80	---	High	High	Moderate.

Table 22.--Soil Features--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
				Uncoated steel	Concrete
	In				
HkA:					
Haskins	>80	---	High	High	Moderate.
HkB:					
Haskins	>80	---	High	High	Moderate.
Hs:					
Hoytville	>80	---	High	High	Low.
Ht:					
Hoytville	>80	---	High	High	Low.
Kn:					
Knoxdale	>80	---	Moderate	Low	Low.
La:					
Landes	>80	---	Moderate	Low	Low.
Lb:					
Latty	>80	---	High	High	Low.
Lc:					
Latty	>80	---	High	High	Low.
LtA:					
Lucas	>80	---	Moderate	High	Moderate.
LuB2:					
Lucas	>80	---	Moderate	High	Moderate.
LuC2:					
Lucas	>80	---	Moderate	High	Moderate.
Md:					
Medway	>80	---	High	High	Low.
Me:					
Mermill	>80	---	High	High	Moderate.
Mg:					
Millgrove	>80	---	High	High	Moderate.
NnA:					
Nappanee	>80	---	High	High	Moderate.
NpA:					
Nappanee	>80	---	High	High	Moderate.
NpB:					
Nappanee	>80	---	High	High	Moderate.
NpB2:					
Nappanee	>80	---	High	High	Moderate.
OsB:					
Oshtemo	>80	---	Moderate	Low	High.
OtB:					
Ottokee	>80	---	Low	Low	Moderate.
Pc:					
Paulding	>80	---	High	High	Moderate.

Table 22.--Soil Features--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
				Uncoated steel	Concrete
	Depth	Hardness			
	In				
Pt:					
Pits, quarry.					
RkA:					
Rimer	>80	---	High	High	Moderate.
RkB:					
Rimer	>80	---	High	High	Moderate.
RmA:					
Rimer	>80	---	High	High	Moderate.
Fulton	>80	---	High	High	Moderate.
RnA:					
Roselms	>80	---	High	High	High.
RoA:					
Roselms	>80	---	High	High	High.
RoB:					
Roselms	>80	---	High	High	High.
RpA:					
Roselms	>80	---	High	High	High.
RpB2:					
Roselms	>80	---	High	High	High.
Rt:					
Rossburg	>80	---	Moderate	Low	Low.
Sb:					
Saranac	>80	---	High	High	Low.
Sh:					
Shoals	>80	---	High	High	Low.
Sk:					
Shoals	>80	---	High	High	Low.
StB2:					
St. Clair	>80	---	Moderate	High	Moderate.
StC2:					
St. Clair	>80	---	Moderate	High	Moderate.
StD2:					
St. Clair	>80	---	Moderate	High	Moderate.
StE2:					
St. Clair	>80	---	Moderate	High	Moderate.
SuC3:					
St. Clair	>80	---	Moderate	High	Moderate.
SuE3:					
St. Clair	>80	---	Moderate	High	Moderate.
TeA:					
Tedrow	>80	---	Moderate	Low	Moderate.

Table 22.--Soil Features--Continued

Map symbol and soil name	Bedrock		Potential frost action	Risk of corrosion	
				Uncoated steel	Concrete
	In				
Tn:					
Toledo	>80	---	High	High	Low.
To:					
Toledo	>80	---	High	High	Low.
Uc:					
Udorthents.					
Wb:					
Wabasha	>80	---	High	High	Low.
WhA:					
Whitaker	>80	---	High	High	Moderate.

Table 23.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Belmore	Typic Hapludalfs, fine-loamy, mixed, mesic
Bixler	Aquic Arenic Hapludalfs, loamy, mixed, mesic
Broughton	Aquic Hapludalfs, very fine, illitic, mesic
Defiance	Aeric Fluvaquents, fine, illitic, nonacid, mesic
Flatrock	Fluvaquentic Eutrochrepts, fine-loamy, mixed, mesic
Fulton	Aeric Epiaqualfs, fine, illitic, mesic
Granby	Typic Endoaquolls, sandy, mixed, mesic
Haskins	Aeric Epiaqualfs, fine-loamy, mixed, mesic
Hoytville	Mollic Epiaqualfs, fine, illitic, mesic
Knoxdale	Dystric Fluventic Eutrochrepts, fine-loamy, mixed, mesic
Landes	Fluventic Hapludolls, coarse-loamy, mixed, mesic
Latty	Typic Epiaquepts, fine, illitic, nonacid, mesic
Lucas	Oxyaquic Hapludalfs, fine, illitic, mesic
Medway	Fluvaquentic Hapludolls, fine-loamy, mixed, mesic
Mermill	Mollic Epiaqualfs, fine-loamy, mixed, mesic
Millgrove	Typic Argiaquolls, fine-loamy, mixed, mesic
Nappanee	Aeric Epiaqualfs, fine, illitic, mesic
Oshtemo	Typic Hapludalfs, coarse-loamy, mixed, mesic
Ottokee	Aquic Udipsamments, mixed, mesic
Paulding	Typic Epiaquepts, very fine, illitic, nonacid, mesic
Rimer	Aquic Arenic Hapludalfs, loamy, mixed, mesic
Roselms	Aeric Epiaqualfs, very fine, illitic, mesic
Rossburg	Fluventic Hapludolls, fine-loamy, mixed, mesic
Saranac	Fluvaquentic Endoaquolls, fine, mixed, mesic
*Shoals	Aeric Fluvaquents, fine-loamy, mixed, nonacid, mesic
St. Clair	Oxyaquic Hapludalfs, fine, illitic, mesic
Tedrow	Aquic Udipsamments, mixed, mesic
Toledo	Mollic Endoaquepts, fine, illitic, nonacid, mesic
Udorthents	Udorthents
Wabasha	Mollic Fluvaquents, fine, illitic, nonacid, mesic
Whitaker	Aeric Endoaqualfs, fine-loamy, mixed, mesic

Interpretive Groups

Interpretive Groups

(See text for definitions of land capability subclass, prime farmland, woodland ordination symbol, and pasture and hayland suitability groups. Absence of an entry indicates that an interpretive group is not assigned)

Map symbol and soil name	Land capability subclass	Prime farmland code*	Woodland ordination symbol	Pasture and hayland suitability group
BeB Belmore	2e	1	4A	A-1
BkA Bixler	2w	2	4S	C-1
BrB2 Broughton	3e	0	4C	F-5
BrC2 Broughton	4e	0	4C	F-5
BrD2 Broughton	6e	0	4R	F-5
BrE2 Broughton	7e	0	4R	F-6
BsC3 Broughton	6e	0	4C	F-6
BsD3 Broughton	7e	0	4R	F-5
Db Defiance	3w	2	3C	C-2
Dc Defiance	3w	4	3C	C-2
Fb Flatrock	2w	1	4A	A-5
Fc Flatrock	2w	3	4A	A-5
FtA Fulton	3w	2	4C	C-2
FuA Fulton	3w	2	4C	C-2
FuB2 Fulton	3e	2	4C	C-2
FxA Fulton	3w	2	4C	C-2
FxB Fulton	3e	2	4C	C-2
Gr Granby	4w	0	4W	B-1
HaA Haskins	2w	2	4A	C-1

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability subclass	Prime farmland code*	Woodland ordination symbol	Pasture and hayland suitability group
HkA—Haskins	2w	2	4A	C-1
HkB—Haskins	2e	2	4A	C-1
Hs—Hoytville	2w	2	4W	C-1
Ht—Hoytville	2w	2	4W	C-1
Kn—Knoxdale	2w	1	5A	A-5
La—Landes	2w	1	7A	A-5
Lb—Latty	3w	2	4W	F-7
Lc—Latty	3w	2	4W	F-7
LtA—Lucas	1	1	4C	A-1
LuB2—Lucas	3e	1	4C	A-1
LuC2—Lucas	4e	0	4C	A-1
Md—Medway	2w	1	5A	A-5
Me—Mermill	2w	2	5W	C-1
Mg—Millgrove	2w	2	5W	C-1
NnA—Nappanee	3w	2	5C	F-7
NpA—Nappanee	3w	2	5C	F-7
NpB—Nappanee	3e	2	5C	F-7
NpB2—Nappanee	3e	2	5C	F-7
OsB—Oshtemo	3e	1	4A	A-1
OtB—Ottokee	3s	0	4S	B-1

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability subclass	Prime farmland code*	Woodland ordination symbol	Pasture and hayland suitability group
Pc Paulding	3w	0	4W	F-7
Pt. Pits, quarry				
RkA Rimer	2w	0	4A	C-1
RkB Rimer	2e	0	4A	C-1
RmA	2w	0		
Rimer			4A	C-1
Fulton			4C	C-2
RnA Roselms	3w	0	3C	F-7
RoA Roselms	3w	0	3C	F-7
RoB Roselms	3w	0	3C	F-7
RpA Roselms	3w	0	3C	F-7
RpB2 Roselms	3w	0	3C	F-7
Rt Rossburg	2w	1	5A	A-5
Sb Saranac	3w	2	5W	C-3
Sh Shoals	2w	2	5W	C-3
Sk Shoals	2w	4	5W	C-3
StB2 St. Clair	3e	1	3C	F-5
StC2 St. Clair	4e	0	3C	F-5
StD2 St. Clair	6e	0	3R	F-5
StE2 St. Clair	7e	0	3R	F-6
SuC3 St. Clair	6e	0	3C	F-5
SuE3 St. Clair	7e	0	3R	F-5

See footnote at end of table.

Interpretive Groups--Continued

Map symbol and soil name	Land capability subclass	Prime farmland code*	Woodland ordination symbol	Pasture and hayland suitability group
TeA---------- Tedrow	3s	0	4S	B-1
Tn---------- Toledo	3w	2	4W	C-2
To---------- Toledo	3w	2	4W	C-2
Uc. Udorthents				
Wb---------- Wabasha	3w	4	4W	C-3
WhA---------- Whitaker	2w	2	4A	C-1

* Prime farmland codes:
0--Not prime farmland.
1--All areas are prime farmland.
2--Only drained areas are prime farmland.
3--Only areas protected from flooding or not frequently flooded during the growing season are prime farmland.
4--Only drained areas that are protected from flooding or not frequently flooded during the growing season are prime farmland.