Soil Survey of
Union County, Ohio

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

March 2002
Supplement

How to Use This Soil Survey

General Soil Map

The general soil map, which is the color map immediately following the general soil map units, 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** of this survey for a general description of the soils in your area.

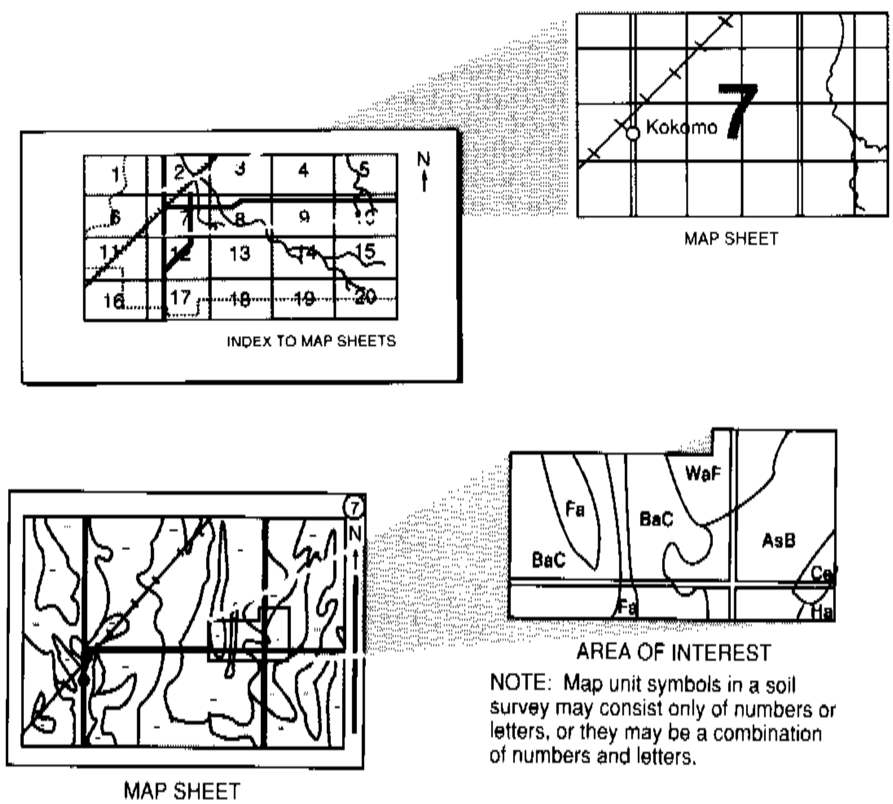
Detailed Soil Maps

The detailed soil maps, which accompany this publication are 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**, which accompanies the soil maps. Note the number of the map sheet, and select that sheet.

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

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



This revised 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 1968. Soil names and descriptions were approved in May, 1970. Unless otherwise indicated, statements in this publication refer to soil conditions in the survey area in 1968. The 1975 soil survey publication was made cooperatively by the Natural Resources Conservation Service and the Ohio Department of Natural Resources, Division of Lands and Soil. This survey is part of the technical assistance furnished to the Union Soil and Water Conservation District.

Soil maps, referred to in this publication, 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: Starting at the upper right corner and moving counterclockwise: young prairie grass on Nappanee silt loam, 0 to 2 percent slopes and Paulding silty clay loam; the Genesee-Eel-Shoals-Fox association alongside Mill Creek; clean, well designed drainage ditch on Pewamo silty clay loam; wetland construction on Paulding silty clay, the rises are Nappanee silt loam, 0 to 2 percent slopes.

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Preface

This revised soil survey publication contains information that can be used in land-planning programs in Union County. It contains predictions of soil behavior for selected land uses. The publication also highlights limitations and hazards inherent in the soil, 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.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. 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 which accompanies this publication. The location of each soil is shown on the detailed soil maps which also accompany this publication. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service, the Ohio Department of Natural Resources, Division of Soil and Water Conservation, or the Ohio State University Extension.

Soil Survey of
Union County, Ohio

Fieldwork by D. D. Waters, A. Ritchie, and K. L. Powell, Ohio Department of Natural Resources, Division of Lands and Soil and F. Matanzo and W.H. Brug, Soil Conservation Service

Revised by K.E. Miller, D.M. Balduff, and S.A. Miller, Ohio Department of Natural Resources, Division of Soil and Water Conservation. Technical advisor, R.M. Gehring, Natural Resources Conservation Service.

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.

Union County is in the central part of Ohio (fig.1). It has an area of about 434 square miles, or 279,488 acres. Marysville, the county seat, is near the center of the county, about 31 miles northwest of Columbus, the State capital.

A large part of the farm income in 1997 was derived from the sale of corn, oats wheat, soybeans, and hay. Livestock and livestock products, mainly dairy products, beef cattle, and swine are raised extensively on many farms and are part of the farm income on some farms. Only a small part of the farm income is derived from wood products.

Most of the soils are deep. All the soils formed in glacial till or glacial outwash of Wisconsinan age or in recent alluvium.

This soil survey updates the survey of Union County published in 1975 (USDA, 1972). It provides additional data and soil interpretations.

Figure 1. –Location of Union County in Ohio

General Nature of the County

This section gives general information about the county. It describes climate, geology and relief, drainage, farming, and industry.

Climate

Prepared by the Natural Resources Conservation Service National Water and Climate Center, Portland, Oregon.

Climate Tables are created from climate station Marysville, Ohio.

Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from First Order Station Columbus, Ohio.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Marysville 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 the length of the growing season.

In winter, the average temperature is 27.4 degrees F and the average daily minimum temperature is 18.9 degrees. The lowest temperature on record, which occurred at Marysville on January 10, 1982, was -23 degrees. In summer, the average temperature is 70.8 degrees and the average daily maximum temperature is 82.1 degrees. The highest temperature, which occurred at Marysville on July 14, 1936, was 109 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 average annual total precipitation is about 35.72 inches. Of this, about 19.78 inches, or 55 percent, usually falls in May through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.82 inches at Marysville on June 2, 1997. Thunderstorms occur on about 41 days each year, and most occur between May and August.

The average seasonal snowfall is 23.0 inches. The greatest snow depth at any one time during the period of record was 19 inches recorded on January 21, 1978. On an average, 29 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 15.0 inches recorded on November 26, 1950.

The average relative humidity in mid-afternoon is about 59 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time in summer and 36 percent in winter. The prevailing wind is from the southwest. Average wind speed is highest, around 10 miles per hour, from December to April.

Geology and Relief

Union County is in the Central Lowland (26) province of the United States. Glaciers deposited a mantle of till material of varying thickness over limestone bedrock in the area that is now Union County. The earliest glaciating probably took place during the Illinoian age, and the second during the Wisconsinan age.

The Wisconsinan glaciers completely covered the glacial drift deposited by the earlier Illinoian glaciers; therefore, the Illinoian till material is not exposed in Union County.

The glacial till is not homogeneous. It varies mainly in texture and composition and is high in content of calcareous material derived mostly from local limestone bedrock. Recessional moraines transect the county from northwest to southeast and are characterized by broad belts of sloping topography.

The glaciers deposited stratified sand and gravel outwash, mostly along a few of the principal streams in the county. Lacustrine material was deposited in relatively small areas on bottoms of temporary glacial lakes over glacial till. Recent alluvial material was deposited on the flood plains of existing streams.

The limestone bedrock in Union County is mostly covered by glacial till. It is exposed only in places where streams have cut down through the till. The bedrock in Union County is Monroe limestone, except at the extreme eastern edge of the county, where the bedrock is Delaware Limestone. (26).

Drainage

The present drainage of Union County developed on a surface deposited by the last glacier of the Wisconsinan age. The surface consisted mostly of areas of gently sloping ground moraines and areas of steeper recessional moraines.

The streams in the County are Rush, Fulton, Bokes, Mill, Big Darby, Blues, Little Darby, Treacle, and Spain Creeks and Powder Lock, Otter, Sugar, Robinson, Brush, Rocky Fork, Buck, and Proctor Runs.

Big Darby and Blues Creeks and most of the other creeks flow from northwest to southeast. Big Darby Creek flows along the southern edge of a recessional moraine, and Blues Creek flows along the northern edge of a recessional moraine.

All streams drain into the Scioto River, which is outside the boundaries of Union County.

Farming

According to the 1997 United States Census of Agriculture, there were 811 farms in Union County. A total of 204,693 acres was in farms.

The sale of crops made up 62 percent of the income derived from farming, and the remaining 38 percent was from the sale of livestock.

The 1997 acreages of the main crops harvested were 51,280 acres of corn; 18,527 acres of wheat; 489 acres of oats; 84,585 acres of soybeans; and 8,095 acres of alfalfa and alfalfa mixtures cut for hay.

Industry

Prepared by the Union County Chamber of Commerce.

Dozens of industries have made major investments in the Union County community. They have located their manufacturing plants and offices in an area that offers many "big city" advantages--but with all the charm of small town living.

It’s an ideal site for manufacturers of automotive components and consumer products as well as for warehousing and distribution facilities. The businesses and industries located in Union County are important to the community's success.

How This Survey Was Made

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

This revised soil survey publication updates the survey text manuscript of Union County issued in 1975. It provides additional data and soil interpretations in a newer format.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Miamian and Brookston, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil indicates a feature that affects management. For example, Fox silt loam, 0 to 2 percent slopes, is one of several phases within the Fox series.

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

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

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Gravel pits is a land type in Union County.

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

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of users, among them farmers, managers of woodland, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

Much information has been revised throughout this publication. These revisions are due mainly to changes in terminology, interpretations, and changes in land use and land use practices. The classification and correlation of the soils have not been revised from the original survey.

General Soil Map Units

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

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils or miscellaneous areas can be identified on the map. Likewise, areas that 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, building, or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

Soil Descriptions

1. Blount-Wetzel-Pewamo association

Somewhat poorly drained, poorly drained, and very poorly drained soils that formed in moderately fine textured glacial till; on uplands

Part of this association is a large area in the northern part of the county, and the rest extends from just east of Marysville to the eastern border. This association makes up about 47 percent of the county. It is 64 percent Blount soils, 18 percent Wetzel soils, 13 percent Pewamo soils, and 5 percent Morley and other soils.

This association is underlain by compact glacial till. The landscape is a nearly level to gently sloping and undulating till plain. Low knolls are typical.

Blount soils are very deep, nearly level to gently sloping, and somewhat poorly drained. Pewamo and Wetzel soils are very deep and nearly level. Pewamo soils are very poorly drained and Wetzel soils are poorly drained. In places they are in depressions. Both of these soils are darker colored than Blount soils.

Nearly all of this association is farmed. The chief enterprise is cash-grain farming. Dairying and the raising of hogs and beef cattle also are parts of some farm enterprises.

All the major soils in this association are seasonally wet. Fieldwork is delayed in spring unless the soils are adequately drained. Much of the association is drained. Slow or moderately slow permeability and a seasonal high water table are major limitations for many nonfarm uses.

2. Blount-Morley-Pewamo association

Somewhat poorly drained, moderately well drained, and very poorly drained soils that formed in moderately fine textured glacial till on uplands

This association makes up two distinct belts several miles wide that extend northwest to southeast across the county north of Big Darby Creek. The association makes up about 23 percent of the county. It is 50 percent Blount soils, 34 percent Morley soils, 14 percent Pewamo soils, and 2 percent other soils.

Most of the association is underlain by compact glacial till. Both belts are on a landform common to recessional moraines. The landscape is one of irregularly shaped broad ridges, gently rolling hills, and steeper slopes adjacent to streams. Slopes range from nearly level to very steep.

Blount soils are very deep, nearly level to gently sloping, and somewhat poorly drained. Morley soils are very deep, mainly gently sloping to moderately steep, and moderately well drained. They are on low knolls and side slopes. Pewamo soils are very deep, nearly level, dark colored, and very poorly drained. They are mostly adjacent to drainageways.

Most of this association is farmed. The chief enterprise is cash-grain farming. A significant acreage is in pasture. Dairying and the raising of sheep and beef cattle are parts of some farm enterprises.

Most of the dominant soils that are cultivated are seasonally wet. Fieldwork is delayed in spring unless soils are adequately drained. Much of the association is drained. Slow or moderately slow permeability and a seasonal high water table in the Blount and Pewamo soils are limitations for many nonfarm uses.

3. Morley-Blount association

Moderately well drained and somewhat poorly drained soils that formed in moderately fine textured glacial till; on uplands

This association consists of long, narrow, hilly areas adjacent to the major streams north of Big Darby Creek. It is mostly in the east-central part of the county. It makes up about 1 percent of the county. It is 65 percent Morley soils, 30 percent Blount soils, and 5 percent Pewamo and other soils.

This association is underlain by compact glacial till. The dominant soils are mostly sloping to very steep. The landscape is characterized by hills, slopes along streams, and small areas of gently sloping, somewhat poorly drained soils.

Morley soils are very deep, gently sloping to very steep, and moderately well drained. Blount soils are mostly gently sloping and are somewhat poorly drained.

Most of this association is farmed. Much of the acreage is used for cash-grain farming, and the rest is pasture. Dairying and the raising of sheep and beef cattle are parts of some farm enterprises.

The dominant soils in this association are moderately well drained and are subject to erosion. Wetness delays fieldwork on the somewhat poorly drained soils in spring. Most of these soils are artificially drained. Slow or moderately slow permeability and a seasonal high water table in the Blount soils are limitations for many nonfarm uses.

4. Nappanee-Paulding-St. Clair association

Somewhat poorly drained, very poorly drained, and moderately well drained soils that formed in wave-modified, fine-textured glacial till; on old glacial lakebeds

This association is a large area that extends northwest from Marysville to the boundary of Union and Logan Counties. It makes up about 11 percent of the county. It is 50 percent Nappanee soils, 25 percent Paulding soils, 20 percent St. Clair soils, and 5 percent other soils.

The landscape is one of nearly level to sloping till plains and moraines. The dominant soils are fine textured. They formed in clayey till at the bottom of former glacial lakes. The upper part of the till was modified by water action.

All the soils are very deep. Nappanee soils are nearly level to gently sloping and somewhat poorly drained. Paulding soils are nearly level and very poorly drained. They are darker colored than Nappanee soils. St. Clair soils are gently sloping to sloping and moderately well drained. They are on slight rises and low knolls and are adjacent to streams.

A large part of this association is farmed. The rest is forest and pasture. The chief enterprise is raising grain for livestock, mainly dairy cattle and beef cattle and a few sheep.

The dominant soils in this association are seasonally wet and are slow to dry out. Fieldwork is delayed in spring unless drainage is adequate. A seasonal high water table is a limitation for many nonfarm uses.

5. Brookston-Crosby association

Very poorly drained and somewhat poorly drained soils that formed in medium-textured glacial till; on uplands

This association is south of Big Darby Creek in the southern part of the county. It makes up about 13 percent of the county. It is 55 percent Brookston soils, 35 percent Crosby soils, and 10 percent Miamian, Celina, and other soils.

Figure 2. This northern red oak tree has been left standing as a seed tree on this low area of Brookston silty clay loam.

This association is nearly level to undulating. Most of it is underlain by loam-textured glacial till.

The dark-colored Brookston soils are nearly level and very poorly drained. In places they are in depressions. The lighter colored Crosby soils are nearly level to gently sloping and gently undulating and are on low knolls. Miamian and Celina soils are steeper than Brookston and Crosby soils.

A large part of this association is cultivated. A small acreage, mainly the undrained Brookston soil, is wooded. The chief enterprise is cash-grain farming. Also important are dairying and the raising of hogs and beef cattle. Most farms are family enterprises.

The dominant soils in this association are seasonally wet. Fieldwork is delayed in spring unless the soils are artificially drained. Much of the association is drained by tile. Slow to moderate permeability and a seasonal high water table are limitations for many nonfarm uses.

6. Fox-Lippincott association

Well-drained and very poorly drained soils that formed in medium-textured outwash material underlain by stratified sand and gravel; on terraces

This association is nearly level to moderately steep and is on terraces along Big Darby Creek in the southern part of the county. It makes up about 2 percent of the county. It is 50 percent Fox soils, 25 percent Lippincott soils, and 25 percent Sloan, Ross, Genesee, and Warsaw soils.

Fox soils are well drained, nearly level to moderately steep, and moderately deep over calcareous sand and gravel. The dark-colored Lippincott soils are nearly level, very poorly drained, and moderately deep over sand and gravel. The Sloan, Ross, and Genesee are on bottom lands and Warsaw soils are on outwash terraces.

Much of this association is used for cash-grain crops. Also important are dairying and the raising of hogs and beef cattle. Most farms are family enterprises.

Most of this association is well suited to most farm crops. Fieldwork on the wetter Lippincott soils is delayed in spring. Except for seasonal wetness in the Lippincott soils and occasional flooding on some of the lower terraces, the dominant soils in this association have few limitations for most nonfarm uses.

This association is an important source of sand and gravel for use in construction. Fox and Lippincott soils are underlain by thick deposits of sand and gravel.

7. Genesee-Eel-Shoals-Fox association

Well drained, moderately well drained, and somewhat poorly drained soils that formed in medium textured or moderately fine textured material; on flood plains and terraces

This association is mostly along the major streams. It makes up about 3 percent of the county. It is about 30 percent Genesee soils, 20 percent Eel soils, 15 percent Shoals soils, 10 percent Fox soils, and 25 percent Montgomery, Westland and other soils.

The Genesee, Eel, and Shoals soils are deep and nearly level and are on flood plains. Shoals soils are wetter than the other soils in this association. Fox soils are on low terraces and are subject to occasional flooding. They are nearly level to sloping, well drained, and moderately deep over sand and gravel.

Most of this association is farmed. The majority of the farms are of the cash-grain type. Dairying and the raising of swine and beef cattle are other important enterprises.

Most of this association is subject to periodic flooding in winter and spring. Flooding is a serious limitation for most nonfarm uses.

Detailed Soil Map Units

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

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. 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 similar components. 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 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 segments that have similar use and management requirements. The delineation of such landscape 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. The principal hazards and limitations to be considered in planning for specific uses are discussed.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying layers, 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 or of the underlying layers. They also can differ in slope, stoniness, wetness, 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, Miamian silt loam, 2 to 6 percent slopes is a phase of the Miamian series.

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

Table 4 "Acreage and Proportionate Extent of the Soils" gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of 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.

Soil Descriptions

Ag--Algiers silt loam

Setting

Landform: flood plain
Position on the landform: flats, oxbows
Size and shape of areas: 10 to 20 acres; long, narrow, and winding

Map Unit Composition

Algiers and similar components: 95 percent

Contrasting Components

Sloan soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 11.0 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 10 to 20 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 1.0 feet
Water table kind: Apparent
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: Occasional
Organic matter content in the surface layer: 2.0 to 4.0 percent
Parent material: Alluvium
Permeability: Moderately slow or moderate
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Low
Surface layer texture: Silt loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight
Distinctive soil property: Buried soil horizons

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment

Figure 3. Wheat growing on Blount silt loam, 0 to 2 percent slopes

to the dry summer months or to periods when the soil is frozen.

Building sites

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

Septic tank absorption fields

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Special design of roads and streets is needed to prevent the structural damage caused by low soil strength.
- Special design of roads and bridges is needed to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

BoA--Blount silt loam, 0 to 2 percent slopes

Setting
Landform: till plain
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 200 acres; broad and irregular or oval

Map Unit Composition
Blount and similar components: 90 percent

Contrasting Components
Pewamo soils: 5 percent
Wetzel soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 17 to 22 meq per 100 grams
Depth class: Very deep

Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 2.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

BoB--Blount silt loam, 2 to 6 percent slopes

Setting
Landform: till plains
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 200 acres; broad and irregular, or oval

Map Unit Composition
Blount and similar components: 85 percent

Contrasting Components
Morley soils: 5 percent
Pewamo soils: 5 percent
Wetzel soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 17 to 22 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 2.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2e
Prime farmland: Prime farmland if drained
Hydric soil: No

BoB2--Blount silt loam, 2 to 6 percent slopes, moderately eroded

Setting
Landform: till plain
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 15 acres; long and narrow, oval or irregular

Map Unit Composition
Blount and similar components: 85 percent

Contrasting Components
Morley soils: 5 percent
Pewamo soils: 5 percent
Wetzel soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.4 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 17 to 22 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 2.0 to 3.0 percent
Parent material: Till, unspecified

Permeability: Slow or moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2e
Prime farmland: Prime farmland if drained
Hydric soil: No

Bs--Brookston silty clay loam

Setting
Landform: till plain
Position on the landform: flats, depressions, drainageways
Size and shape of areas: 5 to several thousand acres; broad and irregular

Map Unit Composition
Brookston and similar components: 90 percent

Contrasting Components
Crosby soils: 5 percent
Odell soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 9.5 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 16 to 28 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Brief
Depth of ponding: 0.0 to 0.5 feet
Drainage class: Very poorly drained
Flooding: None
Organic matter content in the surface layer: 4.0 to 8.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow or moderate
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silty clay loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight
Distinctive soil property: Dark colored surface layer

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: Yes

CeA--Celina silt loam, 0 to 2 percent slopes

Setting
Landform: till plain
Position on the landform: flats, slight rises
Size and shape of areas: 2 to 10 acres; irregular or oval

Map Unit Composition
Celina and similar components: 100 percent

Similar Components
Crosby

Soil Properties and Qualities

Available water capacity: About 6.1 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 8 to 21 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Systematic subsurface drainage will extend the period of planting and harvesting crops.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- The root systems of plants may be damaged by frost action.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 1
Prime farmland: All areas are prime farmland
Hydric soil: No

CeB--Celina silt loam, 2 to 6 percent slopes

Setting
Landform: till plain
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 25 acres; long and winding or irregular

Map Unit Composition
Celina and similar components: 100 percent

Similar Components
Miamian

Soil Properties and Qualities

Available water capacity: About 6.0 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 8 to 21 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- The root systems of plants may be damaged by frost action.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

CrA--Crosby silt loam, 0 to 2 percent slopes

Setting
Landform: till plain
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 150 acres; broad and irregular or oval

Map Unit Composition
Crosby and similar components: 95 percent

Similar Components
Odell

Contrasting Components
Brookston soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 5.4 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 6 to 21 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings

and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

CrB--Crosby silt loam, 2 to 6 percent slopes

Setting
Landform: till plain
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 75 acres; irregular

Map Unit Composition
Crosby and similar components: 95 percent

Similar Components
Celina
eroded areas

Contrasting Components
Brookston soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 5.4 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 6 to 21 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.

- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2e
Prime farmland: Prime farmland if drained
Hydric soil: No

Cu--Cut and fill land

Setting
Size and shape of areas: 5 to 25 acres; square or rectangular or irregular

Map Unit Composition
Cut and fill land and similar components: 100 percent

Use and Management Considerations

Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Prime farmland: Not prime farmland
Hydric soil: No

Ee--Eel silt loam

Setting
Landform: flood plains
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 50 acres; long, narrow and winding, or irregular

Map Unit Composition
Eel and similar components: 95 percent

Similar Components
Genesee
Shoals

Contrasting Components
Sloan soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 11.9 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 12 to 20 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 1.0 to 3.0 feet
Water table kind: Apparent
Ponding: None
Drainage class: Moderately well drained
Flooding: Occasional
Organic matter content in the surface layer: 3.0 to 6.0 percent
Parent material: Alluvium
Permeability: Moderately slow or moderate
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Low
Surface layer texture: Silt loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- The root systems of plants may be damaged by frost action.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

Septic tank absorption fields

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Special design of roads and bridges is needed to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: 2w
Prime farmland: All areas are prime farmland
Hydric soil: No

FoA--Fox silt loam, 0 to 2 percent slopes

Setting
Landform: outwash terraces
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 50 acres; broad irregular or oval

Map Unit Composition
Fox and similar components: 99 percent

Contrasting Components
Occasionally flooded areas: 1 percent

Soil Properties and Qualities

Available water capacity: About 5.3 inches to a depth of 33 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 24 to 42 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash
Permeability: moderate in the upper layers and rapid in the underlying material
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- Sandy soils may have a limited available water capacity. The resulting droughty

conditions could increase the seedling mortality rate.
- The sandy textures reduce the traction of wheeled forestry equipment.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The excessive permeability limits the proper treatment of the effluent from septic systems in areas of this soil. The poorly treated effluent may pollute the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The low bearing strength of this soil is generally unfavorable for supporting heavy loads. Special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

Interpretive Groups

Land capability classification: 2s
Prime farmland: All areas are prime farmland
Hydric soil: No

FoB--Fox silt loam, 2 to 6 percent slopes

Setting
Landform: outwash terraces
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 40 acres; broad irregular

Map Unit Composition
Fox and similar components: 100 percent

Soil Properties and Qualities

Available water capacity: About 5.2 inches to a depth of 33 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 24 to 42 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash
Permeability: moderate in the upper layers and rapid in the underlying material
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- Sandy soils may have a limited available water capacity. The resulting droughty conditions could increase the seedling mortality rate.
- The sandy textures reduce the traction of wheeled forestry equipment.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The excessive permeability limits the proper treatment of the effluent from septic systems in areas of this soil. The poorly treated effluent may pollute the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The low bearing strength of this soil is generally unfavorable for supporting heavy loads. Special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

FoB2--Fox silt loam, 2 to 6 percent slopes, moderately eroded

Setting
Landform: outwash terraces
Position on the landform: low knolls, side slopes
Size and shape of areas: 2 to 10 acres; long and winding or irregular

Map Unit Composition
Fox and similar components: 100 percent

Soil Properties and Qualities

Available water capacity: About 5.1 inches to a depth of 33 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 24 to 42 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash
Permeability: moderate in the upper layers and rapid in the underlying materials
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- Sandy soils may have a limited available water capacity. The resulting droughty conditions could increase the seedling mortality rate.
- The sandy textures reduce the traction of wheeled forestry equipment.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The excessive permeability limits the proper treatment of the effluent from septic systems in areas of this soil. The poorly treated effluent may pollute the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The low bearing strength of this soil is generally unfavorable for supporting heavy loads. Special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

FoC2--Fox silt loam, 6 to 12 percent slopes, moderately eroded

Setting
Landform: outwash terraces
Position on the landform: knolls, side slopes
Size and shape of areas: 2 to 10 acres; elongated or irregular

Map Unit Composition
Fox and similar components: 100 percent

Similar Components
Kendallville

Soil Properties and Qualities

Available water capacity: About 4.9 inches to a depth of 33 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 24 to 42 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash
Permeability: moderate in the upper layers and rapid in the underlying material
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- Sandy soils may have a limited available water capacity. The resulting droughty conditions could increase the seedling mortality rate.
- The sandy textures reduce the traction of wheeled forestry equipment.

Building sites

- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The excessive permeability limits the proper treatment of the effluent from septic systems in areas of this soil. The

poorly treated effluent may pollute the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The low bearing strength of this soil is generally unfavorable for supporting heavy loads. Special design of local roads and streets is needed to prevent the structural damage caused by low soil strength.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 3e
Prime farmland: Not prime farmland
Hydric soil: No

Gn--Genesee silt loam

Setting
Landform: flood plains
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 250 acres; long, narrow and winding

Map Unit Composition
Genesee and similar components: 95 percent

Similar Components
Eel

Contrasting Components
Sloan soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 12.2 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 9 to 21 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: Occasional
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Alluvium
Permeability: Moderately slow or moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Low
Surface layer texture: Silt loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.

Pastureland

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The sandy textures reduce the traction of wheeled forestry equipment.

Building sites

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

Figure 4. Genesee silt loam provides good path and trail material and provides plenty of recreational opportunities along Mill Creek.

Septic tank absorption fields

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Special design of roads and bridges is needed to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: 2w
Prime farmland: All areas are prime farmland
Hydric soil: No

Gp--Gravel pits

Setting
Size and shape of areas: 1 to 20 acres; oval or irregular

Map Unit Composition
Gravel pits and similar components: 100 percent

Use and Management Considerations

Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Prime farmland: Not prime farmland
Hydric soil: No

HeA--Henshaw silt loam, 0 to 2 percent slopes

Setting
Landform: stream terraces
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 20 acres; long and narrow or irregular

Map Unit Composition
Henshaw and similar components: 90 percent

Contrasting Components
Montgomery soils: 5 percent
Occasionally flooded areas: 5 percent

Soil Properties and Qualities

Available water capacity: About 11.0 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 6 to 14 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Apparent
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 0.5 to 2.0 percent
Parent material: Lacustrine deposits
Permeability: Moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Low
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

Ho--Homer silt loam

Setting
Landform: outwash terraces
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 20 acres; irregular

Map Unit Composition
Homer and similar components: 95 percent

Contrasting Components
Lippincott soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 5.3 inches to a depth of 38 inches
Cation-exchange capacity of the surface layer: 6 to 17 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 36 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Apparent
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash
Permeability: moderate in the solum and rapid in the underlying material
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The sandy textures reduce the traction of wheeled forestry equipment.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

Ka--Kane silt loam

Setting
Landform: outwash terraces
Position on the landform: flats, slight rises
Size and shape of areas: 2 to 10 acres; irregular

Map Unit Composition
Kane and similar components: 95 percent

Contrasting Components
ponded areas: 5 percent

Soil Properties and Qualities

Available water capacity: About 7.2 inches to a depth of 38 inches
Cation-exchange capacity of the surface layer: 17 to 22 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 35 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Water table kind: Apparent
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 3.0 to 5.0 percent
Parent material: Outwash
Permeability: moderate in the solum over rapid in the underlying material
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The sandy textures reduce the traction of wheeled forestry equipment.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

KeA--Kendallville silt loam, 0 to 2 percent slopes

Setting
Landform: till plains and stream terraces
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 25 acres; irregular

Map Unit Composition
Kendallville and similar components: 100 percent

Similar Components
Fox

Soil Properties and Qualities

Available water capacity: About 4.8 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 10 to 20 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash over till, unspecified
Permeability: Moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops is restricted by dense soil material.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.

- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 1
Prime farmland: All areas are prime farmland
Hydric soil: No

KeB--Kendallville silt loam, 2 to 6 percent slopes

Setting
Landform: till plains
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 25 acres; irregular or elongated

Map Unit Composition
Kendallville and similar components: 100 percent

Similar Components
Fox

Soil Properties and Qualities

Available water capacity: About 4.8 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 10 to 20 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Outwash over till, unspecified
Permeability: Moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops is restricted by dense soil material.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.

- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

Lc--Lippincott silty clay loam

Setting
Landform: low outwash terraces
Position on the landform: flats, depressions, drainageways
Size and shape of areas: 5 to 50 acres; long and winding or broad irregular

Map Unit Composition
Lippincott and similar components: 95 percent

Contrasting Components
Homer soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.7 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 15 to 30 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 24 to 36 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Brief
Depth of ponding: 0.0 to 0.5 feet
Drainage class: Very poorly drained
Flooding: None
Organic matter content in the surface layer: 4.0 to 8.0 percent
Parent material: Outwash
Permeability: moderate in the solum over rapid in the underlying material
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silty clay loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer

from moisture stress because of the limited available water capacity.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: Yes

MlB--Miamian silt loam, 2 to 6 percent slopes

Setting
Landform: till plain
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 30 acres; oval or irregular

Map Unit Composition
Miamian and similar components: 100 percent

Similar Components
steeper, moderately eroded areas
Celina

Soil Properties and Qualities

Available water capacity: About 4.9 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 0.5 to 3.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

MIC2--Miamian silt loam, 6 to 12 percent slopes, moderately eroded

Setting
Landform: till plain
Position on the landform: knolls, side slopes
Size and shape of areas: 5 to 20 acres; long and winding or irregular

Map Unit Composition
Miamian and similar components: 100 percent

Similar Components
slightly eroded areas
severely eroded areas

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 0.5 to 3.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 3e
Prime farmland: Not prime farmland
Hydric soil: No

MID2--Miamian silt loam, 12 to 18 percent slopes, moderately eroded

Setting
Landform: till plain
Position on the landform: knolls, side slopes
Size and shape of areas: 2 to 10 acres; long and winding or irregular

Map Unit Composition
Miamian and similar components: 95 percent

Similar Components
slightly eroded areas
severely eroded areas

Contrasting Components
gullied areas: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 0.5 to 3.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.

- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The slope increases the hazard of erosion on logging roads.
- The slope creates a safety hazard affecting the use of forestry equipment. The equipment should be operated only on the contour.

Building sites

- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 4e
Prime farmland: Not prime farmland
Hydric soil: No

MIF2--Miamian silt loam, 18 to 35 percent slopes, moderately eroded

Setting
Landform: till plain
Position on the landform: side slopes
Size and shape of areas: 2 to 5 acres; long and winding or irregular

Map Unit Composition
Miamian and similar components: 100 percent

Soil Properties and Qualities

Available water capacity: About 4.5 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 8 to 18 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 0.5 to 3.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: High
Wind erosion hazard: Slight

Use and Management Considerations

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- The slope may restrict the use of some farm equipment.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The slope increases the hazard of erosion on logging roads.
- Because of the slope, specialized forestry equipment is required.

Building sites

- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 6e
Prime farmland: Not prime farmland
Hydric soil: No

Mn--Montgomery silty clay loam

Setting
Landform: low stream terraces, uplands
Position on the landform: flats, depressions
Size and shape of areas: 5 to 50 acres; broad irregular or oval

Map Unit Composition
Montgomery and similar components: 99 percent

Similar Components
silty clay surface

Contrasting Components
Occasionally flooded areas: 1 percent

Soil Properties and Qualities

Available water capacity: About 9.6 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 20 to 36 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Long
Depth of ponding: 0.0 to 1.0 feet
Drainage class: Very poorly drained
Flooding: None

Organic matter content in the surface layer: 3.0 to 6.0 percent
Parent material: Lacustrine deposits
Permeability: Slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silty clay loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 3w
Prime farmland: Prime farmland if drained
Hydric soil: Yes

MrB--Morley silt loam, 2 to 6 percent slopes

Setting
Landform: till plains
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 50 acres; broad irregular or oval

Figure 5. This grassed waterway is used to divert water flowing off the high Morley loam to an outlet to stop gully erosion.

Map Unit Composition
Morley and similar components: 90 percent

Similar Components
Blount

Contrasting Components
Pewamo soils: 5 percent
Wetzel soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

MrB2--Morley silt loam, 2 to 6 percent slopes, moderately eroded

Setting
Landform: till plains
Position on the landform: knolls, side slopes
Size and shape of areas: 5 to 40 acres; irregular or elongated

Map Unit Composition
Morley and similar components: 90 percent

Similar Components
Blount

Contrasting Components
Pewamo soils: 5 percent
Wetzel soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: Moderate
Rock fragments on surface: None

Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

MrC--Morley silt loam, 6 to 12 percent slopes

Setting
Landform: till plains
Position on the landform: knolls, side slopes
Size and shape of areas: 5 to 20 acres; irregular or elongated

Map Unit Composition
Morley and similar components: 100 percent

Similar Components
Blount

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.

- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 3e
Prime farmland: Not prime farmland
Hydric soil: No

MrC2--Morley silt loam, 6 to 12 percent slopes, moderately eroded

Setting
Landform: till plains
Position on the landform: knolls, side slopes
Size and shape of areas: 5 to 50 acres; irregular or elongated

Map Unit Composition
Morley and similar components: 100 percent

Similar Components
Blount

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow

Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 3e
Prime farmland: Not prime farmland
Hydric soil: No

MrD2--Morley silt loam, 12 to 18 percent slopes, moderately eroded

Setting
Landform: till plains
Position on the landform: side slopes
Size and shape of areas: 5 to 20 acres; irregular or elongated

Map Unit Composition
Morley and similar components: 100 percent

Similar Components
slightly eroded areas

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.
- The slope increases the hazard of erosion on logging roads.
- The slope creates a safety hazard affecting the use of forestry equipment. The equipment should be operated only on the contour.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 4e
Prime farmland: Not prime farmland
Hydric soil: No

MrE2--Morley silt loam, 18 to 25 percent slopes, moderately eroded

Setting
Landform: till plains
Position on the landform: side slopes
Size and shape of areas: 2 to 10 acres; irregular or elongated

Map Unit Composition
Morley and similar components: 95 percent

Similar Components
slightly eroded areas

Contrasting Components
gullied areas: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: High
Wind erosion hazard: Slight

Use and Management Considerations

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.
- The slope increases the hazard of erosion on logging roads.
- The slope creates a safety hazard affecting the use of forestry equipment. The equipment should be operated only on the contour.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The restricted permeability of this soil limits the absorption and proper

treatment of the effluent from septic systems.

- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 6e
Prime farmland: Not prime farmland
Hydric soil: No

MrF2--Morley silt loam, 25 to 50 percent slopes, moderately eroded

Setting
Landform: till plains
Position on the landform: side slopes
Size and shape of areas: 2 to 10 acres; irregular or elongated

Map Unit Composition
Morley and similar components: 95 percent

Similar Components
slightly eroded areas

Contrasting Components
gullied areas: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.6 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 18 to 24 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: High
Wind erosion hazard: Slight

Use and Management Considerations

Pastureland

- This soil is generally not recommended for pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The seasonal high water table limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.
- The slope increases the hazard of erosion on logging roads.
- Because of the slope, specialized forestry equipment is required.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may

require some special design and construction techniques or maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs are required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 7e
Prime farmland: Not prime farmland
Hydric soil: No

Mu--Muskego muck

Setting
Landform: till plains
Position on the landform: enclosed depressions
Size and shape of areas: 5 to 20 acres; oval or irregular

Map Unit Composition
Muskego and similar components: 100 percent

Similar Components
marl beneath the sapric material
silt loam overwash
over 40 inches of sapric material

Soil Properties and Qualities

Available water capacity: About 19.4 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 140 to 180 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: At or near the surface
Water table kind: Apparent
Ponding: Long
Depth of ponding: 0.0 to 1.0 feet
Drainage class: Very poorly drained
Flooding: None
Organic matter content in the surface layer: 60.0 to 90.0 percent
Parent material: Organic, herbaceous material
Permeability: Slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Muck
Potential for surface runoff: Negligible
Wind erosion hazard: Severe
Distinctive soil property: Organic soil layers

Use and Management Considerations

Cropland

- Maintaining vegetative cover and establishing windbreaks reduce the hazard of wind erosion.

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsidence or shrinkage of the muck causes displacement of subsurface drains.
- Control of the water table helps reduce subsidence, prevent burning, and reduce the hazard of wind erosion.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.
- When drained, the organic layers in this soil subside. Subsidence leads to differential rates of settlement which may cause foundations to break. Because of the high potential for subsidence, this soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Subsidence of the organic material reduces the bearing capacity of this soil.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 3w
Prime farmland: Not prime farmland
Hydric soil: Yes

NpA--Nappanee silt loam, 0 to 2 percent slopes

Setting
Landform: till floored lake bed
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 50 acres; oval, elliptical or irregular

Map Unit Composition
Nappanee and similar components: 95 percent

Contrasting Components
Paulding soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.0 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 10 to 15 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.0 feet
Water table kind: Perched

Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow to moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is

caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 3w
Prime farmland: Prime farmland if drained
Hydric soil: No

NpB--Nappanee silt loam, 2 to 6 percent slopes

Setting
Landform: till floored lake bed
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 75 acres; elliptical, elongated or irregular

Map Unit Composition
Nappanee and similar components: 95 percent

Contrasting Components
Paulding soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.0 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 10 to 15 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow to moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.

- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 3e
Prime farmland: Prime farmland if drained
Hydric soil: No

OdA--Odell silt loam, 0 to 2 percent slopes

Setting
Landform: till plains
Position on the landform: flats, slight rises
Size and shape of areas: 2 to 10 acres; elliptical or irregular

Map Unit Composition
Odell and similar components: 95 percent

Similar Components
Crosby

Contrasting Components
Brookston soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 5.0 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 11 to 25 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.5 to 1.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 2.0 to 4.0 percent
Parent material: Loess over till, unspecified
Permeability: Moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer

from moisture stress because of the limited available water capacity.
- The root system of winter grain crops may be damaged by frost action.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.
- The rooting depth of crops is restricted by dense soil material.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

Pa--Paulding silty clay

Setting
Landform: till-floored lake bed
Position on the landform: flats, depressions
Size and shape of areas: 5 to 150 acres; long winding or broad irregular

Map Unit Composition
Paulding and similar components: 95 percent

Similar Components
silty clay loam surface

Contrasting Components
Nappanee soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 3.2 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 24 to 34 meq per 100 grams
Depth class: Very deep

Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Long
Depth of ponding: 0.0 to 1.0 feet
Drainage class: Very poorly drained
Flooding: None
Organic matter content in the surface layer: 3.0 to 5.0 percent
Parent material: Till, unspecified
Permeability: Very slow
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silty clay
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Clods may form if the soil is tilled when wet.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- The movement of water into subsurface drains is restricted. Drainage guides can be used to determine tile spacing requirements.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 3w
Prime farmland: Not prime farmland
Hydric soil: Yes

Pm--Pewamo silty clay loam

Setting
Landform: till plain
Position on the landform: flats, depressions, drainageways
Size and shape of areas: 5 to several thousand acres; long winding or broad irregular

Map Unit Composition
Pewamo and similar components: 90 percent

Similar Components
Montgomery
Wetzel

Contrasting Components
Algiers soils: 5 percent
Blount soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 11.2 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 10 to 40 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Brief
Depth of ponding: 0.0 to 1.0 feet
Drainage class: Very poorly drained
Flooding: None
Organic matter content in the surface layer: 4.0 to 8.0 percent
Parent material: Till, unspecified
Permeability: Moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silty clay loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.

- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: Yes

Qu--Quarries

Setting
Size and shape of areas: 3 to 50 acres; rectangular

Map Unit Composition
Quarries and similar components: 100 percent

Use and Management Considerations

Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Land capability classification: None assigned
Prime farmland: Not prime farmland
Hydric soil: No

Ro--Ross silt loam

Setting
Landform: flood plains
Position on the landform: flats and slight rises
Size and shape of areas: 5 to 50 acres; long and winding or irregular

Map Unit Composition
Ross and similar components: 90 percent

Contrasting Components
Lippincott soils: 5 percent
Warsaw overwash soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 11.6 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 12 to 26 meq per 100 grams
Depth class: Very deep

Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: Greater than 3.0 feet
Ponding: None
Drainage class: Well drained
Flooding: Occasional
Organic matter content in the surface layer: 3.0 to 5.0 percent
Parent material: Alluvium
Permeability: Moderately slow or moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silt loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Controlling traffic can minimize soil compaction.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.

Pastureland

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

Septic tank absorption fields

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Special design of roads and bridges is needed to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: 2w
Prime farmland: All areas are prime farmland
Hydric soil: No

ScB--St. Clair silt loam, 2 to 6 percent slopes

Setting
Landform: till floored lake bed
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 50 acres; irregular

Map Unit Composition
St. Clair and similar components: 95 percent

Similar Components
Nappanee

Contrasting Components
Paulding soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.2 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 5 to 25 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow to moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- Severe shrinking and swelling of the soil may crack basement walls. Foundations and other structures generally require special design and construction techniques or intensive maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 3e
Prime farmland: All areas are prime farmland
Hydric soil: No

ScB2--St. Clair silt loam, 2 to 6 percent slopes, moderately eroded

Setting
Landform: till floored lake bed
Position on the landform: low knolls, side slopes
Size and shape of areas: 5 to 30 acres; elongated or irregular

Map Unit Composition
St. Clair and similar components: 95 percent

Similar Components
Nappanee

Contrasting Components
Paulding soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.2 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 5 to 25 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow to moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.

- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- Severe shrinking and swelling of the soil may crack basement walls. Foundations and other structures generally require special design and construction techniques or intensive maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 3e
Prime farmland: All areas are prime farmland
Hydric soil: No

ScC--St. Clair silt loam, 6 to 12 percent slopes

Setting
Landform: till floored lake bed
Position on the landform: knolls and side slopes
Size and shape of areas: 2 to 20 acres; elongated or irregular

Map Unit Composition
St. Clair and similar components: 100 percent

Similar Components
moderately eroded areas
moderately steep slopes

Soil Properties and Qualities

Available water capacity: About 4.2 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 5 to 25 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow to moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- Severe shrinking and swelling of the soil may crack basement walls. Foundations and other structures generally require special design and construction techniques or intensive maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 4e
Prime farmland: Not prime farmland
Hydric soil: No

ScC2--St. Clair silt loam, 6 to 12 percent slopes, moderately eroded

Setting
Landform: till floored lake bed
Position on the landform: knolls, side slopes
Size and shape of areas: 2 to 20 acres; irregular

Map Unit Composition
St. Clair and similar components: 95 percent

Similar Components
severely eroded areas
moderately steep slopes

Contrasting Components
gullied areas: 5 percent

Soil Properties and Qualities

Available water capacity: About 4.2 inches to a depth of 30 inches
Cation-exchange capacity of the surface layer: 5 to 25 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Dense material: 20 to 40 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Water table kind: Perched
Ponding: None
Drainage class: Moderately well drained
Flooding: None
Organic matter content in the surface layer: 1.0 to 3.0 percent
Parent material: Till, unspecified
Permeability: Slow to moderate
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: High
Surface layer texture: Silt loam
Potential for surface runoff: Medium
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- Using a system of conservation tillage and planting cover crops reduce the runoff rate and help to minimize soil loss by erosion.
- Erosion has removed part of the surface soil, and the remaining surface soil is less productive and more difficult to manage.
- Incorporating crop residue or other organic matter into the surface layer increases the capacity of the soil to hold and retain moisture. Plants may suffer from moisture stress because of the limited available water capacity.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- The rooting depth of crops may be restricted by dense soil material and high clay content.

Pastureland

- Avoiding overgrazing can reduce the hazard of erosion.
- Maintaining healthy plants and vegetative cover can reduce the hazard of erosion.
- Erosion control is needed when pastures are renovated.
- Plants may suffer moisture stress during the drier summer months because of the limited available water capacity.
- Using a system of conservation tillage when pastures are renovated conserves soil moisture.
- This soil provides poor summer pasture.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care

to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.

Building sites

- Severe shrinking and swelling of the soil may crack basement walls. Foundations and other structures generally require special design and construction techniques or intensive maintenance.
- The slope influences the use of machinery and the amount of excavation required. Special building practices and designs may be required to ensure satisfactory performance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the slope, special design and installation techniques are needed for the effluent distribution lines and seepage of poorly treated effluent is a concern.
- The restricted permeability of this soil limits the absorption and proper treatment of the effluent from septic systems.
- The seasonal high water table in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Costly measures may be needed to lower the water table in the area of the absorption field.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.
- Because of the slope, designing local roads and streets is difficult.

Interpretive Groups

Land capability classification: 4e
Prime farmland: Not prime farmland
Hydric soil: No

Sh--Shoals silt loam

Setting
Landform: flood plains
Position on the landform: flats, oxbows
Size and shape of areas: 5 to 50 acres; long winding or irregular

Map Unit Composition
Shoals and similar components: 95 percent

Similar Components
Eel
Algiers

Contrasting Components
Sloan soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 11.5 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 12 to 27 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 1.0 feet
Water table kind: Apparent
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: Occasional
Organic matter content in the surface layer: 2.0 to 5.0 percent
Parent material: Alluvium
Permeability: Moderately slow or moderate
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: High

Surface layer texture: Silt loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Small grain crops may be damaged by flooding in winter and spring.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Under normal weather conditions, this soil is subject to occasional flooding. The flooding may result in physical damage and costly repairs to buildings. This soil is generally unsuited to homesites. Special design of some structures, such as farm outbuildings, may be needed to prevent damage caused by flooding.

Septic tank absorption fields

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Special design of roads and bridges is needed to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

SlA--Sleeth silt loam, 0 to 2 percent slopes

Setting
Landform: outwash terraces
Position on the landform: flats, slight rises
Size and shape of areas: 5 to 20 acres; irregular

Map Unit Composition
Sleeth and similar components: 95 percent

Contrasting Components
Westland soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 10.1 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 5 to 20 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 42 to 60 inches
Depth to the top of the seasonal high water table: 0.5 to 1.0 feet
Water table kind: Apparent
Ponding: None
Drainage class: Somewhat poorly drained
Flooding: None
Organic matter content in the surface layer: 0.5 to 3.0 percent
Parent material: Outwash
Permeability: Moderate in the solum over rapid in the underlying material
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Moderate shrinking and swelling of the soil may crack basement walls. Foundations and other structures may require some special design and construction techniques or maintenance.
- The seasonal high water table may restrict the period when excavations can be made and may require a higher degree of construction site development and building maintenance. It is poorly suited to building site development and structures may need special design to avoid damage from wetness.

Septic tank absorption fields

- Because of the seasonal high water table, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- The seasonal high water table reduces the bearing capacity of this soil.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: No

So--Sloan silty clay loam

Setting
Landform: flood plains
Position on the landform: flats, depressions, oxbows
Size and shape of areas: 5 to 150 acres; long and winding or irregular

Map Unit Composition
Sloan and similar components: 95 percent

Contrasting Components
Algiers soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 10.8 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 19 to 29 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 1.0 feet
Water table kind: Apparent
Ponding: None
Drainage class: Very poorly drained
Flooding: Frequent
Organic matter content in the surface layer: 3.0 to 6.0 percent
Parent material: Alluvium
Permeability: Moderately slow or moderate
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silty clay loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- Winter grain crops are commonly not grown because of frequent flooding.
- Measures that protect the soil from scouring and minimize the loss of crop residue by floodwaters are needed.
- Subsurface drainage helps to lower the seasonal high water table.

Pastureland

- Forage production can be improved by seeding grass-legume mixtures that are tolerant of flooding.
- Sediment left on forage plants after a flood event may reduce palatability and forage intake by the grazing animal.
- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- The frequent flooding in areas of this soil greatly increases the risk of damage associated with floodwaters. Because of the flooding, this soil is generally unsuited to building site development.

Septic tank absorption fields

- This soil is generally unsuited to septic tank absorption fields. The flooding in areas of this soil greatly limits the absorption and proper treatment of the effluent from septic systems. Rapidly moving floodwaters may damage some components of septic systems.

Local roads and streets

- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.
- Special design of roads and bridges is needed to prevent the damage caused by flooding.

Interpretive Groups

Land capability classification: 3w
Prime farmland: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Hydric soil: Yes

WaB--Warsaw silt loam, 1 to 4 percent slopes

Setting

Landform: outwash terraces
Position on the landform: slight rises, low knolls
Size and shape of areas: 2 to 20 acres; elliptical or irregular

Map Unit Composition

Warsaw and similar components: 100 percent

Similar Components

Fox

Soil Properties and Qualities

Available water capacity: About 6.4 inches to a depth of 35 inches
Cation-exchange capacity of the surface layer: 10 to 25 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Strongly contrasting textural stratification: 30 to 40 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Ponding: None
Drainage class: Well drained
Flooding: None
Organic matter content in the surface layer: 2.0 to 5.0 percent
Parent material: Outwash
Permeability: moderate in the upper layers over rapid in the lower layer
Potential frost action: Moderate
Rock fragments on surface: None
Shrink-swell potential: Low
Surface layer texture: Silt loam
Potential for surface runoff: Low
Wind erosion hazard: Slight
Distinctive soil property: High infiltration rate

Use and Management Considerations

Cropland

- Grassed waterways can be used in some areas to slow and direct the movement of water and reduce erosion.
- Careful selection and application of chemicals and fertilizers help to

- minimize the possibility of groundwater contamination.
- Controlling traffic can minimize soil compaction.

Pastureland

- Erosion control is needed when pastures are renovated.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- The sandy textures reduce the traction of wheeled forestry equipment.

Building sites

- This soil is well suited to use as building sites.

Septic tank absorption fields

- The excessive permeability limits the proper treatment of the effluent from septic systems in areas of this soil. The poorly treated effluent may pollute the water table in the area of the absorption field.

Local roads and streets

- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2e
Prime farmland: All areas are prime farmland
Hydric soil: No

Wc--Westland silty clay loam

Setting
Landform: outwash terraces
Position on the landform: flats, depressions, drainageways
Size and shape of areas: 5 to 150 acres

Map Unit Composition
Westland and similar components: 95 percent

Contrasting Components
Sleeth soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 8.5 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 15 to 30 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Brief
Depth of ponding: 0.0 to 0.5 feet
Drainage class: Very poorly drained
Flooding: None
Organic matter content in the surface layer: 2.0 to 6.0 percent
Parent material: Outwash
Permeability: moderate in the solum over rapid in the underlying material
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silty clay loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.

- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups

Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: Yes

We--Wetzel silty clay loam

Setting
Landform: upland
Position on the landform: flats, depressions, drainageways
Size and shape of areas: 5 to several hundred acres; long and narrow or irregular

Map Unit Composition
Wetzel and similar components: 95 percent

Similar Components
Pewamo

Contrasting Components
Blount soils: 5 percent

Soil Properties and Qualities

Available water capacity: About 7.4 inches to a depth of 60 inches
Cation-exchange capacity of the surface layer: 15 to 30 meq per 100 grams
Depth class: Very deep
Depth to root restrictive feature: Greater than 80 inches
Depth to the top of the seasonal high water table: 0.0 to 0.5 feet
Water table kind: Apparent
Ponding: Brief
Depth of ponding: 0.0 to 1.0 feet
Drainage class: Poorly drained
Flooding: None
Organic matter content in the surface layer: 3.0 to 5.0 percent
Parent material: Till, unspecified
Permeability: Slow or moderately slow
Potential frost action: High
Rock fragments on surface: None
Shrink-swell potential: Moderate
Surface layer texture: Silty clay loam
Potential for surface runoff: Negligible
Wind erosion hazard: Slight

Use and Management Considerations

Cropland

- The root system of winter grain crops may be damaged by frost action.
- Careful selection and application of chemicals and fertilizers help to minimize the possibility of groundwater contamination.
- Clods may form if the soil is tilled when wet.
- Controlling traffic can minimize soil compaction.
- The rooting depth of crops may be restricted by the high clay content.
- Maintaining or increasing the content of organic matter in the soil helps to prevent crusting, improves tilth, and increases the rate of water infiltration.
- A combination of surface and subsurface drainage helps to remove excess water.
- Subsurface drainage helps to lower the seasonal high water table.
- Including deep-rooted cover crops in the rotation is important for improving soil structure and providing pathways in the clayey subsoil to facilitate the movement of water into subsurface drains.

Pastureland

- Excess water should be removed, or grass or legume species that are adapted to wet soil conditions should be planted.
- The root systems of plants may be damaged by frost action.
- Restricting grazing during wet periods can minimize compaction.

Woodland

- Soil moisture encourages the growth of competing vegetation. This growth can be controlled by mechanical or chemical methods.
- Because of the high clay content, this soil is sticky when wet and very firm when dry. Planting at the proper moisture content and taking special care to ensure good soil-root contact can lower the seedling mortality rate.
- Unless the use of forestry equipment is restricted to periods when the soil is dry or frozen, low strength can result in the formation of ruts.
- A seasonal high water table can inhibit the growth of some species of seedlings and limits the use of forestry equipment to the dry summer months or to periods when the soil is frozen.

Building sites

- Because water tends to pond on this soil, the period when excavations can be made may be restricted and intensive construction site development and building maintenance may be needed. The soil is generally unsuited to building site development.

Septic tank absorption fields

- Because of ponding, this soil is generally unsuited to use as a site for septic tank absorption fields.

Local roads and streets

- Ponding affects the ease of excavation and grading and limits the bearing capacity of this soil.
- Because of shrinking and swelling, this soil may not be suitable for use as base material for local roads and streets.
- Local roads and streets may be damaged by frost action, which is caused by the freezing and thawing of soil moisture.

Interpretive Groups
Land capability classification: 2w
Prime farmland: Prime farmland if drained
Hydric soil: Yes

Important Farmland

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.

Figure 6. Tillage occurring on Blount silt loam, designated 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. 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.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. 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."

Unique Farmland

Unique Farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops. It has the special combination of soil qualities, location, growing season, and moisture supply needed for the economic production of sustained high yields of a specific high-quality crop when treated and managed by acceptable farming methods. Examples of such crops are tree fruits, berries, and vegetables.

Unique farmland has an adequate supply of available moisture for the specific crops for which it is used because of stored moisture, precipitation, or irrigation and has a combination of soil qualities, growing season, temperature, humidity, air drainage, elevation, aspect, and other factors, such as nearness to markets, that favors the production of a specific food or fiber crop.

Lists of unique farmland are developed as needed in cooperation with conservation districts and others.

Additional Farmland of Statewide Importance

Some areas other than areas of prime farmland and unique farmland are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas is determined by the appropriate state agency or agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed by acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable. In some states additional farmland of statewide importance may include tracts of land that have been designated for agriculture by state law.

Additional Farmland of Local Importance

This land consists of areas that are of local importance in the production of food, feed, fiber, forage, and oilseed crops and are not identified as having national or statewide importance. Where appropriate, this land is identified by local agencies. It may include tracts of land that have been designated for agriculture by local ordinance.

The following map units have been identified as "locally important" in Union County; FoC2 – Fox silt loam, 6 to 12 percent slopes, moderately eroded; MlC2 – Miamian silt loam, 6 to 12 percent slopes, moderately eroded; MrC – Morley silt loam, 6 to 12 percent slopes; MrC2 – Morley silt loam, 6 to 12 percent slopes, moderately eroded; Mu – Muskego muck; Pa – Paulding silty clay; ScC – St. Clair silt loam, 6 to 12 percent slopes; ScC2 – St. Clair silt loam, 6 to 12 percent slopes, moderately eroded.

Hydric Soils

In this section hydric soils are defined and described and the hydric soils in the survey area are listed in table 6.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (5). 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 (7). 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 which identify those estimated soil properties unique to hydric soils have been established (8). 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" (24) and in the "Soil Survey Manual" (23)

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"(25). 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 one (or more) of the approved indicators is present.

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

The map units listed in table 6 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 (8, 9).

Map units that are made up of hydric soils may have small areas, or inclusions, of non-hydric 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 of the landform.

The map units listed in table7, 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.

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.

Interpretative ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The classification of the soils in this survey area are shown in table 25 "Classification of the Soils". The extent of the soils are shown in table 4 "Acreage and Proportionate Extent of the Soils."

Soil Quality

Prepared by Natural Resources Conservation Service, Soil Quality Institute, Ames, Iowa.

SOIL QUALITY is how well soil does what we want it to do. More specifically, soil quality is the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation.

People have different ideas of what a quality soil is. For example: for people active in production agriculture, it may mean highly productive land, sustaining or enhancing productivity, maximizing profits, or maintaining the soil resource for future generations; for consumers, it may mean plentiful, healthful, and inexpensive food for present and future generations; for naturalists, it may mean soil in harmony with the landscape and its surroundings; for the environmentalist, it may mean soil functioning at its potential in an ecosystem with respect to maintenance or enhancement of biodiversity, water quality, nutrient cycling, and biomass production.

What Does Soil Do?

Healthy soil gives us clean air and water, bountiful crops and forests, productive rangeland, diverse wildlife, and beautiful landscapes. Soil does all this by performing five essential functions:

- Regulating water. Soil helps control where rain, snowmelt, and irrigation water goes. Water and dissolved solutes flow over the land or into and through the soil.
- Sustaining plant and animal life. The diversity and productivity of living things depends on soil.
- Filtering potential pollutants. The minerals and microbes in soil are responsible for filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials, including industrial and municipal by-products and atmospheric deposits.
- Cycling nutrients. Carbon, nitrogen, phosphorus, and many other nutrients are stored, transformed, and cycled through soil.
- Supporting structures. Buildings need stable soil for support, and archeological treasures associated with human habitation are protected in soils.

Soil Has Both Inherent And Dynamic Quality.

Inherent soil quality is a soil's natural ability to function. For example, sandy soils drain faster than clayey soils. Deep soils will have more room for roots than soils with bedrock near the surface. These characteristics do not change easily.

Dynamic soil quality is how soil changes depending on how it is managed. Management choices affect the amount of soil organic matter, soil structure, soil depth, water and nutrient holding capacity. One goal of soil quality research is to learn how to manage soil in a way that improves soil function. Soils respond differently to management depending on the inherent properties of the soil and the surrounding landscape.

Soil Quality Is Linked To Sustainability.

Understanding soil quality means assessing and managing soil so that it functions optimally now and is not degraded for future use. By monitoring changes in soil quality, a land manager can determine if a set of practices are sustainable.

Assessing Soil Quality

Soil quality is an assessment of how well soil performs all of its functions. It cannot be determined by measuring only crop yield, water quality, or any other single outcome. The quality of a soil is an assessment of how it performs all of its functions now and how those functions are being preserved for future use.

Soil quality cannot be measured directly, so we evaluate indicators. Indicators are measurable properties of soil or plants that provide clues about how well the soil can function. Indicators can be physical, chemical, and biological characteristics.

Useful indicators :

- are easy to measure
- measure changes in soil functions

- encompass chemical, biological, and physical properties
- are accessible to many users and applicable to field conditions
- are sensitive to variations in climate and management.

Indicators can be assessed by qualitative or quantitative techniques. After measurements are collected, they can be evaluated by looking for patterns and comparing results to measurements taken at a different time or field.

Here are some examples of indicators of soil quality:

Indicator	Relationship to Soil Health
Soil organic matter (SOM)	Soil fertility, structure, stability, nutrient retention; soil erosion.
PHYSICAL: Soil structure, depth of soil, Infiltration and bulk density; water holding capacity	Retention and transport of water and nutrients; habitat for microbes; estimate of crop productivity potential; compaction, plow pan, water movement; porosity; workability.
CHEMICAL: ph; electrical conductivity; extractable N-P-K	Biological and chemical activity thresholds; plant and microbial activity thresholds; plant available nutrients and potential for N and P loss.
BIOLOGICAL: Microbial biomass C and N; potentially mineralizable N; soil respiration.	Microbial catalytic potential and repository for C and N; soil productivity and N supplying potential; microbial activity measure

Soil Quality Is Not An End In Itself

The ultimate purpose of researching and assessing soil quality is not to achieve high aggregate stability, biological activity, or some other soil property. The purpose is to protect and improve long-term agricultural productivity, water quality, and habitats of all organisms including people. We use soil characteristics as indicators of soil quality, but in the end, soil quality must be identified by how it performs its functions.

Managing For Soil Quality

Each combination of soil type and land use calls for a different set of practices to enhance soil quality. Yet, several principles apply in most situations.

1. Add organic matter. Regular additions of organic matter are linked to many aspects of soil quality. Organic matter may come from crop residues at the surface, roots of cover crops, animal manure, green manure, compost, and others. Organic matter, and the organisms that eat it, can improve water holding capacity, nutrient availability, and can help protect against erosion.

2. Avoid excessive tillage. Tillage has positive effects, but it also triggers excessive organic matter degradation, disrupts soil structure, and can cause compaction. For more information about conservation tillage, visit the Conservation Tillage Information Center site.

3. Carefully manage fertilizer and pesticide use. In this century, pesticides and chemical fertilizers have revolutionized U.S. agriculture. In addition to their desired effects, they can harm non-target organisms and pollute water and air if they are mismanaged. Nutrients from organic sources also can become pollutants when misapplied or over-applied. On the positive side, fertilizer can increase plant growth and the amount of organic matter returned to the soil.

4. Increase ground cover. Bare soil is susceptible to wind and water erosion,

and to drying and crusting. Ground cover protects soil, provides habitats for larger soil organisms, such as insects and earthworms, and can improve water availability. Cover crops, perennials, and surface residue increase the amount of time that the soil surface is covered each year.

5. Increase plant diversity. Diversity is beneficial for several reasons. Each crop contributes a unique root structure and type of residue to the soil. A diversity of soil organisms can help control pest populations, and a diversity of cultural practices can reduce weed and disease pressures. Diversity across the landscape and over time can be increased by using buffer strips, small fields, contour strip cropping, crop rotations, and by varying tillage practices. Changing vegetation across the landscape or over time increases plant diversity, and the types of insects, microorganisms, and wildlife that live on your farm.

Research Potential

Most soil quality research is motivated by one of two goals: 1) improving land management on farms and watersheds. 2) monitoring soil at a national or regional scale. The first goal involves site-specific assessment and decision-making, so the link between researchers and farmers is important to the success of the research.

Most research attempts to identify the links among management practices, observable soil characteristics (i.e. soil quality indicators), soil processes (e.g. nutrient cycling), and the performance of soil functions (e.g. productivity and environmental quality). A single study may examine only one or two of these links. Some important directions for future research include:

- Measuring the spatial and temporal variability of soil characteristics, and using patterns of variability as an indicator of soil quality.
- Further define the characteristics of a healthy soil biological community, and approaches to managing soil biology.
- Describing and controlling what happens during the transition time when farmers switch from one set of practices to another.
- Improving nutrient cycling by managing soil biology.
- Identifying low-cost remote techniques for monitoring soil quality regionally.

Cropland Limitations and Hazards

The management concerns affecting the use of the detailed map units in the survey area for crops are shown in table 8 "Cropland Limitations and Hazards." The main concerns in managing nonirrigated cropland are controlling flooding and water erosion, removing excess water, reducing surface crusting, reducing compaction, conserving moisture, and maintaining soil tilth, organic matter, and fertility.

Generally, a combination of several practices is needed to control *water erosion*. Conservation tillage, stripcropping 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 remove *excess water*, lower *seasonal high water tables*, and to reduce *ponding*.

A *surface crust* forms in tilled areas after hard rains and may inhibit seedling emergence. Regular additions of crop residue, manure, or other organic materials help to improve soil structure and minimize crusting.

Tilling within the proper range in moisture content minimizes *compaction*.

Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the water intake rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture. Measures that are effective in maintaining *soil tilth, organic matter, 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 *flooding, ponding, slope,* and *limited organic matter content*.

Flooding--Flooding can damage winter grain and forage crops. A tillage method that partly covers crop residue and leaves a rough or ridged surface helps to prevent removal of crop residue by floodwater. Tilling and planting should be delayed in the spring until flooding is no longer a hazard.

Ponding.--Surface drains helps to remove excess surface water and reduce damage from ponding.

Slope.--Where the slope is more than 15 percent, water erosion is excessive. The selection of crops and use of equipment is limited. Cultivation may be restricted.

Limited organic matter content.--Many soils that have a light colored surface layer have a low or moderately low organic matter content and weak or moderate structure. Regularly adding crop residue, manure, and other organic matter materials to the soil maintains or improves the organic matter content and the soil structure.

Additional limitations and hazards are as follows:

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.

Potential for ground-water pollution.--This is a hazard in soils with excessive permeability, hard bedrock, or a water table within the profile.

Limited available water capacity, poor tilth, restricted permeability, 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.

Frost heave.--Frost heaving can damage deep rooted legumes and some small grains.

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.

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.

Following is an explanation of the criteria used to determine the limitations or hazards for cropland.

Easily eroded.--The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

Excessive permeability.--The upper limit of the permeability range is 6 inches or more within the soil profile.

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 rarely flooded.

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.

Ponding.--Ponding duration is assigned to the component of the map unit.

Potential for ground-water pollution.--The soil has an apparent water table within a depth of 4 feet or hard bedrock within the profile, or permeability is more than 6 inches per hour within the soil.

Poor tilth.--The component of the map unit is severely eroded, has less than 1 percent organic matter in the surface layer, or more than 35 percent clay in the surface layer.

Fair tilth.--The component of the map unit has a silty clay loam surface layer.

Restricted permeability.--Permeability is 0.06 inches per hour or less within the soil profile.

Seasonal high water table.--If the lower water table depth is less than 1.5 feet.

Slope.--The upper slope range of the component of the map unit is more than 15 percent.

Surface crusting.--The organic matter content of the surface layer is less than or equal to 3 percent and the texture is, silt loam, loam, or silty clay loam.

Surface compaction.--The component of the map unit has a silt loam, silty clay loam, or silty clay surface layer.

Frost heave.--The component of the map unit has a high potential frost action.

Part of surface removed.--The surface layer of the component of the map unit is moderately eroded.

Most of surface removed.--The surface layer of the component of the map unit is severely eroded.

Limited organic matter.--The organic matter content of the surface layer of the component of the map unit is less than or equal to 3 percent.

Subsidence of organic matter.--The organic matter content of the surface layer of the component of the map unit is greater than or equal to 20 percent.

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, the system of land capability classification used by the Natural Resources Conservation Service is explained.

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 Ohio State University Extension.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 9 "Land Capability Classes and Yields per Acre of Crops and Pasture." In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss. Yields for dryland crops are based on a crop-fallow system.

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 the table 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 the Ohio State University Extension can provide information about the management and productivity of the soils for those crops.

Crop yield index

Table 10 is the *crop yield index* for Union County. The index reflects the relative productivity of a soil in relation to other soils in the county. It is based on the most productive soil – Westland silty clay loam, receiving a rating of 100, and other soils are ranked against this standard. The index utilizes a crop rotation of corn, soybeans, and winter wheat.

Advances in equipment technology, plant genetics, drainage, nutrient and pest management, and soil management may make standard yield tables obsolete within several years. This index table provides users with the relative productivity of soils which is less affected by these factors.

Land Capability Classification

The capability classification system, used by the Natural Resources Conservation

Service, in which the soils are grouped according to their suitability for crops, is explained on the pages that follow. Management of the soils for row crops, hay, and pasture is suggested by capability units, and estimated yields of the principal crops grown under a high level of management are shown in table 9.

Capability Grouping

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

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

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

CAPABILITY CLASSES, the broadest groups, are designated by numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use, 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, require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants, require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture, woodland, or wildlife.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture, woodland, or wildlife.

Class 8 soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply, or to aesthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, e, *w, s*, or c, to the class number, for example, 2e. The letter e shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class 1 there are no subclasses, because the soils of this class have few limitations. In Union County there are no Class 5 or Class 8 soils.

The acreage of soils in each capability class and subclass is shown in table 10. The capability classification of each map unit is given in the section “Detailed Soil Map Units” and in the yields table and interpretive groups table.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils.

Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-3 or 3e-2. Thus, in one symbol, the Arabic numeral designates the capability class, or degree of limitations; the letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the final Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The capability units in Union County are described on the pages that follow. The descriptions point out hazards and limitations to be considered in management. No specific practices are recommended for drainage or erosion control. Many are possible on any given tract of land, depending on the ability and need of the operator and on future land use.

Capability unit numbers generally are assigned locally, but are a part of a statewide system. All of the units in the system are not represented by the soils of Union County; therefore the numbers are not consecutive.

CAPABILITY UNIT 1-1

This unit consists of nearly level, moderately well drained and well drained soils that have a silt loam surface layer. These soils are in the Celina and Kendallville series. They are on till plains and stream terraces.

The root zone in these soils is moderately deep and normally is moderately acid to very strongly acid. Permeability is moderately slow, and available water capacity is low to moderate.

No features limit the use of these soils for field crops and pasture. If the soils are well managed, there is little or no hazard of erosion. Deterioration of the soil structure can be prevented by growing crops that supply a large amount of residue.

These soils are suited to all field crops, hay, and pasture plants commonly grown in the county. They are also suited to some specialty crops. Under intensive management they can be used for cultivated crops year after year. The Kendallville soil is well suited to irrigation. The Celina soil is less well suited than the Kendallville soil, but can be irrigated.

CAPABILITY UNIT 2e-1

This unit consists of gently sloping, moderately well drained and well drained soils that have a silt loam surface layer. These soils are on till plains and stream terraces. They are in the Celina, Kendallville, and Miamian series.

These soils have a moderately deep root zone, moderately slow permeability, and moderate to low available water capacity. In most places the root zone is moderately acid to very strongly acid.

The erosion hazard is medium. Practices that help to control erosion and that maintain a good supply of plant nutrients and favorable soil tilth are needed.

Soils of this unit are suited to all the field crops, specialty crops, and hay and pasture plants commonly grown in the county. Under intensive management, they can be used for cultivated crops year after year. If less than intensive management is used, erosion control is essential. An adequate plant cover is needed in pastures and hayfields.

CAPABILITY UNIT 2e-2

This unit consists of gently sloping, moderately well drained, slightly eroded and moderately eroded Morley soils. They formed in compact glacial till on uplands.

The soils have a moderately deep root zone, slow or moderately slow permeability, and low available water capacity. In most places the root zone is strongly acid.

The hazard of further erosion is moderate to severe. Potential for surface runoff is medium because permeability is slow in the clayey subsoil and the underlying compact glacial till. If erosion continues, the plow layer will be essentially subsoil material. Practices that help to control erosion and that maintain a good supply of plant nutrients and favorable soil tilth are needed.

The soils in this unit are suited to all the field crops, specialty crops, and hay and pasture plants commonly grown in the county. Under intensive management, they can be used for cultivated crops year after year. If less than intensive management is used, erosion control is essential. An adequate plant cover is needed in pastures and hayfields.

CAPABILITY UNIT 2e-3

This unit consists of gently sloping, well drained soils that have a silt loam surface layer and a loamy subsoil and are 24 to 42 inches deep over sand and gravel. These soils are in the Fox and Warsaw series. They are on outwash terraces, mostly along the major streams in the county.

The surface layer is easy to till. The root zone in most places is moderately deep and commonly is strongly acid. Permeability is moderate in the upper layers and rapid in the lower layer. Available water capacity is low to moderate.

The major limitation to use of these soils for row crops is a moderate hazard of erosion. Droughtiness in dry periods is also a hazard. The soils are well suited to irrigation if erosion is controlled. Keeping them in good tilth is difficult unless the crop provides a large amount of crop residue, especially where the surface layer is loam or is eroded. Warsaw soils have a higher content of organic matter and are easier to keep in good tilth than Fox soils.

Soils of this unit are suited to all of the field crops, hay and pasture plants, and specialty crops commonly grown in the county. Droughtiness makes them better suited to early maturing crops than to crops that mature late in summer. Where management is intensive, row crops can be grown year after year. Where management is less than intensive, practices that help to control erosion are needed. Practices that help to control erosion and that maintain good tilth are beneficial. An adequate plant cover is needed in pastures and hayfields.

CAPABILITY UNIT 2e-4

This unit consists of gently sloping, somewhat poorly drained, slightly eroded and moderately eroded Blount and Crosby soils. These soils formed in calcareous glacial till.

These soils have a moderately deep root zone if they are adequately drained. They are commonly slightly acid to strongly acid. Permeability is slow to moderately slow, and available water capacity is low.

Poor natural drainage and wetness are the major limitations to use of these soils for crops. Part of the time the soils in this unit are saturated, particularly in winter and spring. They are subject to surface crusting in cultivated areas. The gently sloping Crosby and Blount soils are also subject to erosion.

Soils of this unit can be artificially drained. Where adequately drained, they are suited to most of the field crops, hay, and pasture plants commonly grown in the county. Under intensive management, cultivated crops can be grown year after year. Crops that supply a large amount of residue are needed to keep the soil in good tilth. Where less than intensive management is used, practices that help to control erosion are needed in gently sloping areas. Undrained areas are suited to most of the commonly grown field crops, but plating generally is delayed in spring. Hay and pasture plants that tolerate wetness can be seeded in undrained areas. There is little or no hazard of erosion in areas used for pasture or hay or adequately protected by other vegetation.

CAPABILITY UNIT 2w-1

This unit consists of nearly level, moderately well drained and well drained soils that have a silt loam surface layer. These soils are in the Eel, Genesee, and Ross series. They are on flood plains subject to occasional flooding. Flooding generally occurs in winter and spring.

These soils have a very deep root zone. In most places they are slightly acid to moderately alkaline. Permeability is moderately slow or moderate, and available water capacity is high or very high.

Flooding is the main limitation. It is a greater hazard to winter cover crops and to crops grown in spring than to those grown in summer. During floods, more soil material generally is deposited than is lost through erosion. The lighter colored Eel and Genesee soils are susceptible to surface crusting. A crust is less likely to form on Ross soils because the content of organic matter is higher than in Eel and Genesee soils.

All these soils are well suited to specialty crops and to row crops grown in summer. Under intensive management, they can be cultivated year after year. They are well suited to irrigation.

Soils of this unit are well suited to adapted grasses and legumes grown for hay or pasture. Low areas subject to frequent flooding are better suited to permanent grass and trees than to cultivated crops.

CAPABILITY UNIT 2w-2

This unit consists of nearly level, somewhat poorly drained soils that have a silt loam surface layer. These soils are in the Algiers and Shoals series. They are in low areas on flood plains that are subject to occasional flooding.

These soils have a high water table during winter and spring. They remain wet until late in spring unless they are artificially drained. They have a very deep root zone if they are adequately drained; the root zone generally is very deep in summer. Reaction is commonly slightly acid or neutral. Permeability is moderately slow or moderate, and available water capacity is high.

Wetness and the hazard of flooding are the major limitations to use of these soils for crops. Maintaining good tilth is difficult because the soils are frequently worked when wet. If tilled when wet, the soils are likely to puddle and become cloddy.

Under intensive management, these soils can be used for cultivated crops year after year. There is little or no hazard of erosion.

If adequately drained, these soils are suited to most of the commonly grown field crops and hay and pasture plants that tolerate wetness. In areas where flooding is frequent, they should be protected by a permanent cover of grass or trees.

CAPABILITY UNIT 2w-3

This unit consists of nearly level, somewhat poorly drained soils that have a silt loam surface layer. These soils are in the Henshaw, Homer, Kane, and Sleeth series. The Homer, Kane, and Sleeth soils are underlain by gravel and sand at a depth of 30 to 60 inches. The Henshaw soils are underlain by stratified medium textured to moderately fine textured material below a depth of 35 to 45 inches.

These soils have a moderately deep to very deep root zone if they are adequately drained. They are strongly acid to neutral. Permeability is rapid to moderately slow, and available water capacity is moderate to high.

Poor natural drainage and wetness are the major limitations to the use of these soils for crops. The soils are saturated, particularly in spring. They can be artificially drained.

These soils are suited to most of the field crops and hay pasture plants commonly grown in the county. Under intensive management, cultivated crops can be grown year after year. Crops that supply a large amount of residue are needed to keep the soils in good tilth. Where less than intensive management is used, practices that help to control erosion are needed on the more sloping Sleeth and Henshaw soils.

In undrained areas these soils are suited to most of the commonly grown field crops, but planting generally is delayed in spring. Hay and pasture plants that tolerate wetness can be seeded in undrained areas. There is little or no hazard of erosion in areas used for pasture or hay or protected by adequate plant cover.

CAPABILITY UNIT 2w-4

This unit consists of nearly level, very poorly drained soils that have a dark-colored silty clay loam surface layer. These soils are in the Lippincott and Westland series. They are on low outwash terraces that are underlain by gravel and sand.

These soils have a seasonal high water table during winter and spring. The root zone is moderately deep to deep. Reaction is commonly neutral to slightly acid. Permeability is moderate over rapid.

The major limitation to use of these soils for crops is a seasonal high water table. Surface crusting is no particular hazard because the content of organic matter is high. If tilled when wet, these soils, especially the Lippincott soil, are likely to become compacted and cloddy.

These soils can be drained easily. Where adequately drained, they are suited to the field crops, specialty crops, and hay and pasture plants commonly grown in the county. Under intensive management they can be cultivated year after year. There is little or no hazard of erosion. In some years undrained areas are too wet for crops to grow well.

These soils are suited to pasture, even in undrained areas. Pasture plants used for seeding should tolerate some soil wetness. The soils compact if pasture is grazed when wet, and the carrying capacity of the pasture decreases.

CAPABILITY UNIT 2w-5

This unit consists of nearly level, somewhat poorly drained Blount, Crosby and Odell series that have a silt loam surface layer. They formed in calcareous glacial till.

These soils have a moderately deep root zone if they are adequately drained. They are commonly slightly acid to strongly acid.

Permeability is slow to moderately slow, and available water capacity is low.

Poor natural drainage and wetness are the major limitations to use of these soils for crops. Part of the time these soils are saturated, particularly in winter and spring. They are subject to surface crusting in cultivated areas.

These soils can be artificially drained. Where adequately drained, they are suited to most of the field crops, hay, and pasture plants commonly grown in the county. Under intensive management, cultivated crops can be grown year after year. Crops that supply a large amount of residue are needed to keep these soils in good tilth. Where less than intensive management is used, practices that help to control erosion are needed in gently sloping areas. Undrained areas are suited to most of the commonly grown field crops, but planting generally is delayed in spring. Hay and pasture plants that tolerate wetness can be seeded in undrained areas. There is little or no hazard of erosion in areas used for pasture or hay or adequately protected by other vegetation.

CAPABILITY UNIT 2w-6

This unit consists of nearly level, poorly or very poorly drained soils that have a silty clay loam surface layer. These soils are in the Brookston, Pewamo, and Wetzel series. They are underlain by calcareous glacial till.

These soils have a seasonal high water table. They dry out slowly in spring unless they are adequately drained. In summer the root zone is normally very deep. Reaction generally is slightly acid or neutral. Permeability is moderate to slow, and available water capacity is high or moderate.

Poor natural drainage and wetness are the major limitations to use of these soils for crops. The soils can be tilled satisfactorily within only a narrow range of moisture content. They are easily compacted and become cloddy if they are tilled or used for pasture when wet.

Where drainage is adequate and management is intensive, cultivated crops can be grown year after year. Unless adequate drainage is provided, these soils are too wet for cultivated crops in most years.

Drained areas are suited to most of the commonly grown pasture and hay plants, including alfalfa. Undrained areas are suited only to pasture and hay plants that can tolerate wetness for long periods.

CAPABILITY UNIT 2s-1

Fox silt loam, 0 to 2 percent slopes, the only soil in this unit, is well drained. It is 24 to 42 inches deep over stratified sand and gravel. It is on low terraces along streams.

This soil has a deep to moderately deep root zone. It commonly is strongly acid. Available water capacity is low and permeability is moderate over rapid.

The major limitation to use of this soil for crops is the low to medium available water capacity.

This soil is well suited to field crops, specialty crops, and hay and pasture plants commonly grown in the county. Because it is droughty, it is better suited to early maturing crops than to crops that mature late in summer. It is well suited to irrigation. Crops that supply a large amount of crop residue help to keep the soil in good tilth and to conserve moisture by increasing the content of organic matter. There is little or no hazard of erosion.

Generally, this soil is not used for pasture. It is suited to pasture plants that are drought resistant.

CAPABILITY UNIT 3e-1

This unit consists of sloping, well drained, moderately eroded Fox and Miamian series that have a silt loam surface layer. The Fox soils are moderately deep over sandy and gravelly material and the Miamian soils are moderately deep over compact glacial till.

These soils are easy to cultivate. They generally are moderately acid to strongly acid. They mostly have moderate to moderately slow permeability and low available water capacity.

The major limitation to use of these soils for cultivated crops is a severe hazard of further erosion. Droughtiness also is a limitation during dry periods. Because the content of organic matter generally is low, maintaining favorable soil structure is difficult.

Soils of this unit are suited to field crops, specialty crops, and hay or pasture plants commonly grown in the county. Because they are droughty, they are better suited to early maturity crops than to late maturing crops. Returning a large amount of crop residue to the soils is essential so that water will enter the soils readily and good soil structure can be maintained. Row crops can be grown frequently if the cropping system includes crops that are not clean tilled. Close-growing crops and grasses or legumes are needed to help control soil erosion and to supply a large amount of crop residue. These sloping soils can be irrigated, but controlling erosion is difficult.

CAPABILITY UNIT 3e-2

This unit consists of gently sloping soils that have a silt loam surface layer and are underlain by glacial till. These soils are in the Nappanee and St. Clair series.

These soils have a moderately deep root zone that is commonly moderately acid to very strongly acid. Permeability is moderate to slow and available water capacity is low.

Most of the acreage is moderately eroded, and the hazard of further erosion is severe. Practices that help to control erosion and that maintain a good supply of plant nutrients and favorable tilth are needed. Nappanee soils are wet during winter and spring, and drainage is needed to avoid delay in tillage.

The soils of this unit are suited to field crops commonly grown in the county. Erosion is difficult to control. If it is controlled, cultivated crops can be grown frequently. Under intensive management, the cropping system includes close-growing crops and sod or pasture plants. Where less than intensive management is used, soil loss generally is high and tilth is poor.

These soils are well suited to grasses and legumes grown for hay or pasture. An adequate plant cover is needed in hayfields and pastures to protect the soils from erosion.

CAPABILITY UNIT 3e-3

This unit consists of sloping, moderately well drained, eroded and uneroded soils in the Morley series that have a silt loam surface layer. These soils are underlain by compact glacial till.

These soils have a moderately deep root zone. They are commonly strongly acid. Permeability is slow or moderately slow, and available water capacity is low. These soils are saturated for short periods, mostly in the spring, and tillage is delayed.

The major limitation to use of these soils for crops is the hazard of further erosion. Controlling erosion is the major management requirement. Maintaining a good supply of plant nutrients and a high content of organic matter is also essential. The soils are subject to surface crusting if they are cultivated.

The soils of this unit are suited to field crops commonly grown in the county. Erosion is difficult to control. If it is controlled, cultivated crops can be grown frequently. Under intensive management, the cropping system includes close-growing crops and sod or pasture plants. Where less than intensive management is used, soil loss generally is high and tilth is poor.

These soils are well suited to grasses and legumes grown for hay and pasture. An adequate plant cover is needed in the hayfields and pastures to help protect these soils from erosion.

CAPABILITY UNIT 3w-1

This unit consists of nearly level, very poorly drained and somewhat poorly drained soils of the Nappanee and Paulding series. The Paulding soils have a silty clay surface layer and the Nappanee soils have a silt loam surface layer. These soils are underlain by clayey glacial till.

These soils have a seasonal high water table. If adequately drained, they have a moderately deep root zone. Permeability is very slow in the Paulding unit and moderate over slow in the Nappanee. Available water capacity is moderate. Reaction is commonly slightly to strongly acid in Nappanee soils and moderately acid to neutral in Paulding soils.

Poor or somewhat poor natural drainage and wetness are the major limitations to use of these soils for crops. The soils can be tilled satisfactory within only a narrow range of moisture content. They are easily compacted and become cloddy if tilled or used for pasture when wet. The organic matter content is high. The gently sloping Nappanee soils are subject to erosion if used for clean-tilled row crops.

If adequately drained and under intensive management, these soils can be used for cultivated crops year after year. Otherwise, they are too wet for cultivated crops in most years.

Drained areas of these soils are suited to most of the commonly grown pasture and hay crops, including alfalfa. Undrained areas are suited only to pasture and hay crops that can tolerate wetness for long periods.

CAPABILITY UNIT 3w-2

This unit consists of very poorly drained soils that are subject to ponding or flooding. These soils are in the Montgomery, Muskego, and Sloan series. They have a dark-colored surface layer. The surface layer of Montgomery and Sloan soils is silty clay loam, and that of Muskego soils is muck. All are dark colored.

Sloan soils are subject to flooding. Montgomery soils are on low stream terraces and in depressions in the uplands. They generally are at a slightly higher elevation than Sloan soils. They are subject to ponding. Muskego soils are in low-lying, swampy areas and are subject to ponding. Most flooding and ponding occurs in winter and spring.

These soils have a seasonal high water table and dry out slowly in spring. The root zone is deep if the soils are adequately drained. Reaction ranges from slightly acid to moderately alkaline. Available water capacity is high to very high. Permeability is very slow to moderately slow in the Montgomery and Sloan soils and slow in Muskego soils.

Very poor natural drainage and the hazard of flooding are limitations to the use of these soils for crops. Drains can be installed if suitable outlets are available. Muskego soils are subject to subsidence, but this limitation can be overcome by controlling the level of the water table. During dry periods, Muskego soils are subject to soil blowing.

Unless artificially drained, these soils generally are too wet for cultivated crops. Where adequately drained, they are suited to summer-grown row crops. They are not well suited to winter small grain because flooding is a hazard. Under intensive management, cultivated crops can be grown year after year. Muskego soils are well suited to specialty crops. These organic soils are also suited to high value irrigated truck crops.

The soils in this unit generally are well suited to pasture grasses and legumes that can tolerate wetness. Areas that are not readily drained or that are frequently flooded can be kept in permanent pasture or trees.

CAPABILITY UNIT 4e–1

This unit consists of sloping to moderately steep, moderately well drained and well drained soils that have a silt loam surface layer. These soils are in the Miamian, Morley, and St. Clair series. They are on uplands and are underlain by glacial till.

These soils have a moderately deep root zone. They commonly are strongly acid to very strongly acid. Permeability ranges from slow to moderate, and available water capacity is low.

In most areas the soils are moderately eroded and the hazard of further erosion is severe. Controlling erosion is the major management requirement. Maintaining good tilth and a good supply of plant nutrients is also important. All the soils are low in content of organic matter. As a result, they are subject to surface crusting, and clods form if they are tilled when too wet or too dry. Poor germination of seed is likely in cloddy areas.

These soils are suited to the grasses, legumes, and other crops commonly grown in the county. Cultivated crops should be grown infrequently, and control of erosion is essential. Intensive management is needed. The cropping sequence should consist mostly of grasses or legumes grown for pasture or hay.

CAPABILITY UNIT 6e-1

This unit consists of steep and very steep, well-drained soils that have a silt loam surface layer. These soils are in the Miamian and Morley series. They are adjacent to drainageways in uplands and are underlain by glacial till. Limy glacial till is exposed in some places.

These soils are mostly moderately eroded. Except in severely eroded areas, they generally are strongly acid. They have a moderately deep root zone. The content of organic matter is low, and available water capacity is low.

Steep slopes and a severe hazard of erosion are the major limitations to use of these soils for crops. Potential for surface runoff is high. The content of organic matter is low.

These soils are too steep and too eroded to be used for cultivated crops. They are well suited to hay or pasture plants. The carrying capacity of pasture generally is low during dry periods.

CAPABILITY UNIT 7e-1

Morley silt loam, 25 to 50 percent slopes, moderately eroded, the only soil in this unit, is adjacent to drainageways. It is moderately well drained, has a silt loam surface layer, and is underlain by compact glacial till. Limy glacial till is exposed in some places. The root zone is moderately deep. Reaction commonly is strongly acid, except where the underlying limy glacial till is exposed. Available water capacity is low.

This soil is too steep for cultivated crops or hay and for farm equipment. Its use for permanent pasture is limited, and pastures generally have low carrying capacity. The hazard of erosion is very severe if the plant cover is removed.

This soil is suited to trees. Its use as woodland would help protect watersheds.

Irrigation

Irrigation requires very intensive management. In Union County irrigation is used mostly for growing such specialized crops as lawn grasses for commercial testing, nursery stock, and apple and peach trees. Sprinkler irrigation is the method most commonly used.

Generally, soils well suited to irrigation absorb water readily, have adequate available water capacity, and have good drainage. The soils in Union County considered suitable for irrigation are the nearly level and gently sloping Fox, Kendallville, and Warsaw soils. Other soils in the county can be irrigated, depending on the type of crop grown, the soil characteristics, and the weather conditions. Erosion is a hazard on gently sloping soils that are irrigated. Additional information on irrigation of Union County soils can be found in the section "Engineering Uses of the Soils."

The water supply for irrigation in Union County is limited (16). Wells in most places yield only enough water for domestic use. Streamflow varies, and the irrigation water supply from this source is not dependable. Most farm ponds can be used for irrigating only a very limited acreage.

Waste water from industrial plants can be used for irrigation if pollutants have been removed. Industrial waste diverted to a natural stream pollutes the stream. Where no outlet for industrial waste is available except through a stream, the pollutants should be eliminated before the waste water is delivered to the stream. The site for disposal of pollutants should be selected carefully to prevent contamination of the underground water supply. Some soils are not deep enough to insure adequate filtration.

Woodland Management and Productivity

When the first settlers arrived, most of Union County was wooded. Trees were mainly hardwoods. Today, after a century and a half of agricultural development, only about 19,000 acres, or 8 percent of the county, is woodland.

The areas now wooded are small, widely scattered woodlots. These woodlots have been downgraded in quality by repeated cutting of the best trees. Only the poorer quality specimens and less desirable species have been left for future growth.

Compared with the returns from the sale of other farm products, income from the sale of wood products is small. Some good quality logs of red oak white oak, and black walnut are still cut from the better managed woodland, however, and these bring a good return when sold. Farm woodlots are a source of wood for fireplaces and lumber rough construction and of edible nuts and maple syrup. Production of maple syrup has declined. The demand for fireplace wood and for clear, high-quality logs has increased. Consequently, there is need for improving the care and quality of stands of sugar maple, white and red oaks, and black walnut trees through planting and through management of existing woodland.

In addition to adding to farm income, woodland provides aesthetic benefits that cannot be measured in monetary terms. Trees add natural beauty to the landscape and provide a more desirable environment.

Woodland is becoming increasingly more important for its recreational value. As the population increases, the need increases for more areas of woodland for camping, hiking and hunting.

The total acreage of woodland in Union County can be increased by planting programs adapted to the various kinds of soils. All of the soils in the county are suited to selected species. Steep or eroded soils are particularly suited to a woodland type of permanent cover. A transitional crop of conifer trees would improve soil and site conditions in most newly planted open areas. In time these sites would support high quality hardwoods, similar to those in native woodland.

Because most of the soils are too valuable for crops to be used extensively for trees, information about potential productivity of the soils in terms of board feet per acre is limited.

Determining the suitable kinds of trees for planting and for favoring in existing woodland depends, to a great extent on drainage of the soils. Some trees grow well only on well drained or moderately well drained soils. Others grow best in moist areas. In the following paragraphs are examples of soils in this county grouped according to natural drainage and trees that grow best on the soils of each group.

Well drained and moderately well drained soils.—Examples of these soils are the Miamian, Celina, and Fox soils. Trees to be favored in existing stands are red oak, white oak, tulip-poplar, and black walnut. Species suitable for interplanting in wooded areas are black walnut, white pine, tulip-poplar, red pine, and black locust.

Somewhat poorly drained soils.—Examples of these soils are the Blount and Henshaw. Trees to be favored in existing stands are bur oak, white ash, and soft maple. Species suitable for planting in woodland openings are white pine, soft maple, and white ash.

Poorly drained soils of bottom lands.—The Sloan soils are examples of these soils. Trees to be favored in existing stands are sweetgum, pin oak, bur oak and soft maple. Species suitable for planting in woodland openings are white pine, soft maple, and white ash.

Very *poorly drained soils.*—Examples of these wet soils are the Pewamo and Lippincott. Trees to be favored in existing stands are sweetgum, pin oak, soft maple, and white ash. Trees are not generally planted on these soils, nor on Muskego muck.

Windbreaks have been planted on a few farms in the county, mainly to protect the farmstead from winds in winter and early in spring. These windbreaks also add beauty to the landscape. If planted in the proper places, they prevent drifting snow from blocking the roads. By reducing the velocity of the wind near the ground and holding snow where it falls, windbreaks also conserve soil and moisture.

Evergreens are suitable for planting in windbreaks, and they are more effective in winter than deciduous trees. Norway spruce, Austrian pine, white pine, and arborvitae grow on most of the soils in this county.

Detailed information about the potential of individual soils for producing wood fiber and about the major management limitations of the soils for woodland production is available from the county office of the Natural Resources Conservation Service.

Information on woodland management is available from the Ohio Department of Natural Resources, Division of Forestry, the Ohio State University Extension, Farm Services Agency, and the Natural Resources Conservation Service.

Table 11, "Woodland Management and Productivity," can be used by woodland managers in planning the use of soils for woodland crops. Only those soils suitable for woodland crops are listed.

Woodland Productivity

Information about the productivity of the wooded map units in the survey area is given in table 12, "Woodland Management and Productivity".

The potential productivity of merchantable or *common trees* is expressed as a *site index*, determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years. The index applies to fully stocked, even-aged, unmanaged stands. The site indexes shown in table 11 “Woodland Management and Productivity” are averages based on measurements made at sites that are representative of the soil series. When the site index and woodland productivity of different soils are compared, the values for the same tree species should be compared. The higher the site index number, the more productive the soil for that species. Site index values are used in conjunction with yield tables to determine average annual yields. *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.

The first species listed under *common* trees for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Woodland Management

Information about the management of the wooded map units in the survey area is given in table 12 "Woodland Management and Productivity".

The soils are rated for the erosion hazard, the equipment limitation, seedling mortality, the windthrow hazard, and plant competition.

The *erosion hazard* is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive management or special equipment and methods are needed to prevent excessive soil loss.

The *equipment limitation* is *slight* if the use of equipment is not limited to a particular kind of equipment or time of year; *moderate* if there is a short seasonal limitation or a need for some modification in the management of equipment; and *severe* if there is a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings are for seedlings that are from a good planting stock and that are properly planted during a period of average rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Windthrow hazard is *slight* if trees in wooded areas are not expected to be blown down by commonly occurring winds;

moderate if some trees are blown down during periods of excessive soil wetness and strong winds; and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Plant competition is *slight* if there is little or no competition from other plants; *moderate* if plant competition is expected to hinder the development of a fully stocked stand of desirable trees; and *severe* if plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

Figure 6. This windbreak, located on Blount and Wetzel soils, protects a home from cold winter wind, thereby saving energy.

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.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil. Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

Table 13 "Windbreaks and Environmental Plantings" shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in this table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service, the Ohio State University Extension, or from a nursery.

Windbreak Suitability Groups

Windbreak suitability groups consist of soils in which the kinds and degrees of the hazards and limitations that affect the survival and growth of trees and shrubs in windbreaks are about the same.

Group 1 consists of soils that have no soil-related hazards or limitations or only slight hazards or limitations if they are used for windbreaks. Slopes are less than 15 percent.

Group 2M consists of soils that have a moderate available water capacity (5 to 10 inches) because of texture, depth, or both. The soils are well drained and are not affected by salinity. A layer of concentrated lime, if it occurs, is below a depth of 24 inches. Slopes are less than 15 percent.

Group 2L consists of soils that have a layer of concentrated lime (more than 15 percent calcium carbonate equivalent) at a depth of about 15 to 24 inches. The available water capacity is at least 5 inches. The soils are well drained and are not affected by salinity or alkalinity (the electrical conductivity is less than 4 millimhos per centimeter). Slopes are less than 15 percent.

Group 2W consists of soils that have an available water capacity of 5 inches or more. If the soils have a layer of concentrated lime, the layer is below a depth of 15 inches. The depth to a permanent water table is 30 to 60 inches. The soils are not affected by salinity. Slopes are less than 15 percent.

Group 2S consists of soils that are moderately affected by salinity (the electrical conductivity is 4 to 12 millimhos per centimeter). The available water capacity is at least 5 inches. A layer of concentrated lime, if it occurs, is at a depth of 15 inches or more. The water table is at a depth of 30 inches or more. Slopes are less than 15 percent.

Group 3M consists of soils that have an available water capacity of 2 to 5 inches because of texture, depth, or both. A layer of concentrated lime, if it occurs, is at a depth of 15 inches or more. The soils are well drained and are not affected by salinity (the electrical conductivity is less than 4 millimhos per centimeter).

Group 3L consists of soils that have a layer of concentrated lime (more than 15 percent calcium carbonate equivalent) at a depth of less than 15 inches. A permanent water table is at a depth of more than 30 inches. The available water capacity is more than 5 inches. The soils are not affected by salinity (the electrical conductivity is less than 4 millimhos per centimeter). Slopes are less than 15 percent.

Group 3W consists of soils that have an available water capacity of 2 inches or more. If the soils have a layer of concentrated lime, the layer is below a depth of 15 inches. The depth to a permanent water table is 30 inches or less. It is more than 10 inches during all or most of the growing season. The soils are not affected by salinity. Slopes are less than 15 percent.

Group 3S consists of soils that are severely affected by salinity or alkalinity (the electrical conductivity is 12 to 16 millimhos per centimeter). The available water capacity is 5 inches or more. A layer of concentrated lime, if it occurs, is at a depth of more than 15 inches. A permanent water table is at a depth of 30 inches or more. Slopes are less than 15 percent.

Group 4 consists of soils that have slopes of more than 15 percent, except for those in areas where the length of the slopes is 100 feet or less, and the less sloping soils that have very severe limitations, including soils that have a very low available water capacity (2 inches or less); very shallow, stony, or gravelly soils; strongly saline and alkali soils, in which the electrical conductivity is more than 16 millimhos per centimeter; and soils that have a pH of more than 9.0. Rock outcrop also is in this group.

Recreational Development

The soils of the survey area are rated in table 14 "Recreational Development" 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, the ability of the soil to support vegetation, access to water, potential water impoundment sites, and either access to public sewer lines or the capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degrees, for recreational uses by the duration of flooding and the season when it occurs. Onsite assessment of the height, duration, intensity, and frequency of flooding is essential in planning recreational facilities.

Camp areas are tracts of land used intensively as sites for tents, trailers, and campers and for outdoor activities that accompany such sites. These 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 soils are rated on the basis of soil properties that influence the ease of developing camp areas and performance of the areas after development. Also considered are the soil properties that influence trafficability and promote the growth of vegetation after heavy use.

Picnic areas are natural or landscaped tracts of land that are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation after development. The surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Playgrounds are areas used intensively for baseball, football, or similar activities. These areas require a nearly level soil that is free of stones and that can withstand heavy foot traffic and maintain an adequate cover of vegetation. The soils are rated on the basis of soil properties that influence the cost of shaping the site, trafficability, and the growth of vegetation. Slope and stoniness are the main concerns in developing playgrounds. The surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry.

Figure 7. Genesee silt loam floods occasionally along Mill Creek but is still suitable for picnic areas and playgrounds. Riprap has been placed along the stream to reduce stream bank erosion.

Paths and trails are areas used for hiking and horseback riding. The areas should require little or no cutting and filling during site preparation. The soils are rated on the basis of soil properties that influence trafficability and erodibility. Paths and trails should remain firm under foot traffic and not be dusty when dry.

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.

The interpretative ratings in this table help engineers, planners, and others to understand how soil properties influence recreational uses. Ratings for proposed uses are given in terms of limitations. Only the most restrictive features are listed. Other features may limit a specific recreational use.

The degree of soil limitation is expressed as slight, moderate, or severe.

Slight means that soil properties are favorable for the rated use. The limitations are minor and can be easily overcome. Good performance and low maintenance are expected.

Moderate means that soil properties are moderately favorable for the rated use. The limitations can be overcome or modified by special planning, design, or maintenance. During some part of the year, the expected performance may be less desirable than that of soils rated *slight*.

Severe means that soil properties are unfavorable for the rated use. Examples of limitations are slope, bedrock near the surface, flooding, and a seasonal high water table. These limitations generally require major soil reclamation, special design, or intensive maintenance. Overcoming the limitations generally is difficult and costly. The information in table 13 "Recreational Development" can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 15 "Building Site Development" and interpretations for septic tank absorption fields in table 16 "Sanitary Facilities."

Wildlife Habitat

Wildlife is an important natural resource in Union County. Since the early days of settlement and clearing of the land, the wildlife in the county has changed in kind, distribution, and numbers. Because of changes in land use and the resulting changes in wildlife distribution, it is difficult to correlate the kinds and numbers of wildlife with specific soils.

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 15 “Wildlife Habitat”, 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, sorghum, soybeans, rye, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, blue grass, smooth brome, timothy, redtop, orchardgrass, trefoil, 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 bluestem, goldenrod, beggarweed, swithgrass, milkweed, daisies, goldenrod, nightshade, dandelion, wheatgrass, and grama.

*Hardwood trees a*nd 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, beech, maple, aspen, walnut, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, crabapple, viburnum, rose, blackberry, and blueberry. 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 Norway spruce, white pine, arborvitae, red cedar, fir, 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, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, redwing blackbirds, meadowlark, mourning doves, field sparrow, woodchucks, cottontail, coyotes, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, vireos, , tanagers, gray squirrels, fox squirrels, gray fox, white-tailed deer, woodpeckers, and raccoons.

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, mink, and beaver.

For additional information on the development of wildlife habitat contact Union Soil and Water Conservation District Wildlife Specialist, ODNR state game protector for Wildlife District 1, or the Natural Resources Conservation Service.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-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 kind 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 16 "Building Site Development" 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 generally are 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, 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 generally are 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, potential for frost action, 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 17 "Sanitary Facilities" shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. It also shows the suitability of the soils for use as a daily cover for landfill.

Soil properties are important in selecting sites for sanitary facilities and in identifying limiting soil properties and site features to be considered in planning, design, and installation. Soil limitation ratings of *slight, moderate,* or *severe* are given for septic tank absorption fields, sewage lagoons, and trench and area sanitary landfills. Soil suitability ratings of *good, fair,* and *poor* are given for daily cover for landfill.

A rating of *slight* or *good* indicates that the soils have no limitations or that the limitations can be easily overcome. Good performance and low maintenance can be expected. A rating of *moderate* or *fair* indicates that the limitations should be recognized but generally can be overcome by good management or special design. A rating of *severe* or *poor* indicates that overcoming the limitations is difficult or impractical. Increased maintenance may be required.

Septic tank absorption fields are areas in which subsurface systems of tile or perforated pipe distribute effluent from a septic tank into the natural soil. The centerline of the tile is assumed to be at a depth of 24 inches. Only the part of the soil between depths of 24 and 60 inches is considered in making the ratings. The soil properties and site features considered are those that affect the absorption of the effluent, those that affect the construction and maintenance of the system, and those that may affect public health.

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, relatively impervious soil material. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Relatively impervious soil material for the lagoon floor and sides is desirable to minimize seepage and contamination of local ground water.

Table 17 "Sanitary Facilities" 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.

Trench sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil that is excavated from the trench. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. Soil properties that influence the risk of pollution, the ease of excavation, trafficability, and revegetation are the major considerations in rating the soils.

Area sanitary landfill is an area where solid waste is disposed of by placing refuse in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil that is imported from a source away from the site. A final cover of soil at least 2 feet thick is placed over the completed landfill. Soil properties that influence trafficability, revegetation, and the risk of pollution are the main considerations in rating the soils for area sanitary landfills. Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. The ratings in table 16 "Sanitary Facilities" 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 type 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 off site, transported to the landfill, and spread over the waste. The suitability of a soil for use as cover is based on properties that affect workability and the ease of digging, moving, and spreading the material over the refuse daily during both wet and dry periods.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

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 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 18 "Construction Materials" 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.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In table 17 "Construction Materials," 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. Table 18 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 one or more of the following characteristics: a plasticity index of more than 10, a high shrink-swell potential, many stones, slopes of more than 25 percent, or 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 Table 18 "Construction Materials," only the probability of finding material in suitable quantity in or below the soil 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 table 19 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 as much as 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. Coarse 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 generally is 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 19 "Water Management" 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 generally are 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 table 19 "Water Management," 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 more 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 soil blowing 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 soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or 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 particle-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 particle-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.

Engineering Index Properties

Table 20 "Engineering Index Properties" 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 " 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. "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 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 system adopted by the American Association of State Highway and Transportation Officials (AASHTO) *(2)* and the Unified soil classification system *(3)*.

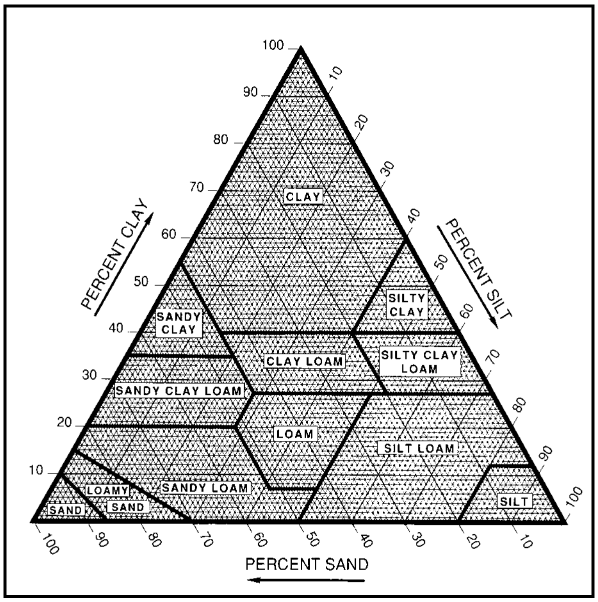

Figure 2.-Percentages of clay, silt, and sand in the basic USDA soil textural classes.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-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 Properties

Table 21 "Physical Properties of the Soils" 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 in the series descriptions of this survey.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. 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 earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. 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 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 measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Soil erodibility (K) and soil-loss tolerance (T) factors are used in an equation that predicts the amount of soil lost through water erosion in areas of cropland. The procedure for predicting soil loss is useful in guiding the selection of soil and water conservation practices.

The *soil erodibility factor (K)* indicates the susceptibility of a soil to sheet and rill erosion by water. The soil properties that influence erodibility are those that affect the infiltration rate, the movement of water through the soil, and the water storage capacity of the soil and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand, sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion

The *fragment-free soil erodibility (Kf) factor* is one of the factors used in the revised Universal Soil Loss Equation. It shows the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

The *soil-loss tolerance factor (T)* is an estimate of the maximum annual rate of soil erosion that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons of soil loss per acre per year. Ratings of 1 to 5 are used, depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind erodibility is directly related to the percentage of dry, nonerodible surface soil aggregates larger than 0.84 millimeter in diameter. From this percentage, the wind erodibility index factor (I) is determined. This factor is an expression of the stability of the soil aggregates, or the extent to which they are broken down by tillage and the abrasion caused by windblown soil particles. Soils are assigned to wind erodibility groups (WEG) having similar percentages of dry soil aggregates larger than 0.84 millimeter.

Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils generally

are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams that have more than 5 percent finely divided calcium carbonate. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils have less than 5 percent finely divided calcium carbonate. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils have less than 5 percent finely divided calcium carbonate. These soils are moderately erodible. Crops can be grown if ordinary measures to control soil blowing are used.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils have less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Additional information about wind erodibility groups and K, Kf, T, and I factors can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Chemical Properties

Table 22 “Chemical Properties of the Soils” 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.

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.

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.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 20 "Physical Properties of Soils," 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.

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 23 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of 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 a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 23 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

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 23 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding 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 ponding 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 ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

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.

Soil Features

Table 24 "Soil Features" gives estimates of several important soil features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Restrictive feature is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Dense layers is an example. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. Depth to the top is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

S*ubsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 24 "Soil Features" shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

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.

A *low* potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a *moderate* potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a *high* potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel 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 the Soils

Published mechanical and chemical analysis data are available on soils similar to those in Union County in the soil surveys for adjacent Champaign and Delaware Counties. Data on Brookston, Celina, Crosby, Fox, Kane, and Lippincott soils are available in the Champaign County soil survey and data on Blount, Morley, and Pewamo soils are available in the Delaware County soil survey.

Unpublished data from numerous other soil sites in Union County can be obtained from the Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (22). 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 25 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Four soil orders are recognized in Union County. 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*, from udic 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, nonacid, 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, arranged in alphabetical order, 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 soil 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" (19). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (13). Newer descriptive terminology has been substituted where there has been no significant change to the original meaning. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Algiers Series

The Algiers series consists of level, somewhat poorly drained soils on flood plains throughout the county. These soils formed in a layer of recent loamy alluvium 14 to 22 inches thick and the underlying dark-colored, loamy to clayey alluvium. The alluvium was washed from areas where the soils formed mainly in calcareous glacial till.

In a representative profile in a cultivated area the plow layer is dark grayish brown silt loam 11 inches thick. Beneath the plow layer is 8 inches of dark grayish brown silt loam, 11 inches of very dark grayish brown silty clay loam, 8 inches of dark gray silty clay mottled with yellowish brown, 9 inches of gray silty clay loam mottled with yellowish brown and very dark gray, and 13 inches or more of grayish brown clay loam mottled with yellowish brown and gray.

These soils are used mostly for crops and pasture. In adequately drained areas, corn and soybeans are the principal crops. Bluegrass is the main pasture plant.

Representative profile of Algiers silt loam in a cultivated field in Leesburg Township, 5-1/2 miles northeast of Marysville, 1,387 feet northwest of the intersection of County Road 196 and State Route 4, adjacent to a tributary of Blues Creek:

Ap— 0 to 11 inches; dark grayish brown (10YR 4/2) silt loam; weak, fine to medium, granular structure; friable; neutral, abrupt smooth boundary.

C—11 to 19 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; slightly acid; clear wavy boundary.

IIAb—19 to 30 inches; very dark grayish brown (10YR 3/2) silty clay loam; moderate medium granular structure; firm; a few continuous black (10YR 2/1) organic coatings; moderately alkaline; clear smooth boundary.

IIB21b—30 to 38 inches; dark gray (10YR 4/1) silty clay; common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm, plastic when wet; thin patchy black (10YR 2/1) clay films; moderately alkaline; clear wavy boundary.

IIB22bg—38 to 47 inches; gray (10YR 5/1) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and very dark gray (10YR 3/1) mottles; moderate medium subangular blocky structure; firm, plastic when wet; thin patchy very dark gray (10YR 3/1) clay films; moderately alkaline; clear wavy boundary.

IIB3bg— 47 to 60 inches; grayish brown (10YR 5/2) clay loam; common fine faint yellowish brown (10YR 5/4) and gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm, plastic when wet; a few thin gray (10YR 5/1) clay films on vertical ped faces; moderately alkaline.

The Ap and C horizons are neutral to slightly acid. The Ap horizon is dominantly dark grayish brown (10YR 4/2) or dark brown (10YR 4/3) when rubbed. The IIAb and IIB21b horizons range from black (N2/0) to very dark gray (10YR 3/1) and are dark brown (10YR 3/3) when rubbed.

Algiers soils are adjacent to the moderately well drained Eel soils, the somewhat poorly drained Shoals soils, and the very poorly drained Sloan soils. They have an A horizon similar to that of Eel and Shoals soils, but they are underlain by very dark grayish brown instead of brown material. They are more poorly drained than Eel soils. They have a lighter colored A horizon than Sloan soils.

Blount Series

The Blount series consists of nearly level to gently sloping soils that are somewhat poorly drained. These soils formed in calcareous glacial till of silty clay loam or clay loam texture. They are on uplands north of Big Darby Creek.

In a representative profile in a cultivated area the plow layer is dark grayish brown silt loam about 6 inches thick. The subsoil is 25 inches thick. In sequence from the top, it is 4 inches of grayish brown to brown silty clay loam mottled with yellowish brown; 12 inches of grayish brown and yellowish brown silty clay that has grayish brown coatings on structure faces; and 9 inches of gray and yellowish brown silty clay loam. The underlying material, reaching to a depth of 60 inches or more, is gray and yellowish brown, calcareous, clay loam till.

These soils are well suited to the crops commonly grown in the county. The main crops are corn, soybeans, small grain, and hay.

Representative profile of Blount silt loam, 0 to 2 percent slopes, in a cultivated field in Allen Township, 1 mile southwest of Allen Center, 825 feet northwest of County Road 148-B, and 2,900 feet northeast of County Road 160.

Ap— 0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; common roots; neutral; abrupt smooth boundary.

B1t— 6 to 10 inches; grayish brown (10YR 5/2) to brown (10YR 5/3) silty clay loam; common fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; thin patchy pale-brown (10YR 6/3) clay films on ped faces; few roots; slightly acid; clear smooth boundary.

B21t—10 to 12 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/4); mottles; moderate, medium and coarse, subangular blocky structure; firm; thin patchy pale-brown (10YR 6/3) clay films on ped faces; few roots; slightly acid; clear smooth boundary.

B22t—12 to 22 inches; yellowish brown (10YR 5/4) silty clay; moderate medium subangular blocky structure; very firm; few roots; medium continuous grayish brown (2.5Y 5/2) clay films on ped faces; slightly acid; clear irregular boundary.

B3t—22 to 31 inches; gray (10YR 5/1) and yellowish brown (10YR 5/4) silty clay loam; weak coarse subangular blocky structure; very firm; thin patchy light brownish gray (10YR 6/2) clay films on ped faces; moderately alkaline and calcareous; gradual wavy boundary.

C—31 to 60 inches; gray (5Y 5/1) and yellowish brown (10YR 5/8) clay loam till; massive; very firm; moderately alkaline and calcareous.

In wooded areas the A1 horizon is very dark grayish brown (10YR 3/2), is 2 to 5 inches thick, and is underlain by 3 to 7 inches of A2 material. The B2t horizon ranges from grayish brown (10YR 5/2) to yellowish brown (10YR 5/4) and has films of pale brown (10YR 6/3), grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2). The B2t horizon is silty clay or clay, is very strongly acid to neutral, and ranges from 10 to 16 inches in thickness. The lower part in places has coarse prismatic structure that parts to subangular blocky. A B3t horizon is present in most places below a depth of 20 to 40 inches. Depth to the B3t horizon and to calcareous material averages about 28 inches. The C horizon is glacial till of clay loam and silty clay loam texture. In some places the soil has a silt capping as much as 14 inches thick.

Blount soils are the somewhat poorly drained members of a drainage sequence that includes the moderately well drained Morley soils and the darker colored very poorly drained Pewamo and Wetzel soils. Their B horizon is less clayey than that of Nappanee soils and is more compact and somewhat more clayey than that of Crosby soils.

Brookston Series

The Brookston series consists of dark-colored, level to nearly level soils that are very poorly drained. These soils formed in calcareous, loamy glacial till. They are on uplands in the Darby Plain region in the southern part of the county.

In a representative profile in a cultivated area the plow layer is black silty clay loam 11 inches thick. The subsoil is 39 inches thick. In sequence from the top, it is 4 inches of black silty clay loam mottled with grayish brown; 7 inches of dark gray silty clay loam mottled with light olive brown; 12 inches of grayish brown silty clay loam mottled with yellowish brown; and 16 inches of olive-gray silt loam mottled with yellowish brown. The underlying material at a depth of 50 inches is gray loam glacial till mottled with yellowish brown.

These soils are well suited to the crops commonly grown in the county. Corn, soybeans, small grain, and hay are the main crops.

Representative profile of Brookston silty clay loam in a cultivated area in Darby Township, 1 mile southwest of Unionville Center, 2,640 feet east of County Road 44, 1,200 feet south of the Penn-Central Railroad tracks:

Ap1—0 to 4 inches; black (10YR 2/1) silty clay loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

Ap2—4 to 11 inches; black (10YR 2/1) silty clay loam; weak medium granular structure; firm; neutral; abrupt smooth boundary.

B21tg—11 to 15 inches; black (10YR 2/1) silty clay loam; few fine faint dark grayish brown (2.5Y 4/2) mottles; strong, fine and medium, angular blocky structure; firm; thin patchy very dark grayish brown (10YR 3/2) clay films on vertical ped faces; slightly acid; clear wavy boundary.

B22tg—15 to 22 inches; dark gray (N 4/0) silty clay loam; common fine distinct light olive brown (2.5Y 4/2) mottles; moderate medium prismatic structure parting to strong medium subangular blocky; very firm; thin continuous dark grayish brown (2.5Y 4/2) clay films on vertical and many horizontal ped faces; neutral; clear smooth boundary.

B23tg—22 to 34 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; strong medium prismatic structure; very firm; thin patchy dark grayish brown (2.5Y 4/2) clay films on vertical ped faces; few fine distinct very dark brown (10YR 2/2) oxide concretions; 2 percent coarse fragments; few black (10YR 2/1) krotovina channels; moderately alkaline; clear irregular boundary.

B3tg —34 to 50 inches; olive-gray (5Y 5/2) silt loam; many, fine and medium, prominent yellowish brown (10YR 5/8) mottles; massive; firm; thin patchy gray (5Y 5/1) clay films in cracks; a few black (10YR 2/1) krotovina channels; 2 percent coarse fragments of dolomite; moderately alkaline and calcareous; clear wavy boundary.

C—50 to 60 inches; gray (5Y 5/1) loam; many medium prominent yellowish brown (10YR 5/8) mottles; massive; firm; moderately alkaline and calcareous.

The A horizon is slightly acid to neutral, ranges from 11 to 17 inches in thickness, and is black (10YR 2/1) or very dark gray (10YR 3/1). The B21tg horizon is black (10YR 2/1) or very dark gray (10YR 3/1). The B22tg horizon is neutral. It has hue of 10YR, 2.5Y, or 5Y, values of 4 or 5; and chromas of 1 or 2. The B2 horizon is silty clay loam or clay loam and is slightly acid to moderately alkaline. Depth to calcareous material ranges from 21 to 45 inches but is typically 27 to 38 inches. The C horizon is loam or silt loam. In some places the soil has a silt capping as much as 14 inches thick.

Brookston soils are the dark-colored, very poorly drained members of a drainage sequence that includes the somewhat poorly drained Crosby soils, the moderately well drained Celina soils, and the well drained Miamian soils. They have a lower content of clay than Pewamo and Wetzel soils.

Celina Series

The Celina series consists of nearly level to gently sloping soils that are moderately well drained. These soils formed in calcareous, loamy glacial till. They are in the Darby Plain region in the southern part of the county.

In a representative profile the plow layer is dark grayish brown silt loam 8 inches thick. The subsurface layer is brown silt loam 2 inches thick. The subsoil is 22 inches thick. In sequence from the top, it is 3 inches of dark brown silt loam; 4 inches of yellowish brown silty clay loam; 4 inches of dark brown silty clay mottled with yellowish brown and grayish brown; and 7 inches of yellowish brown and brown silty clay and silty clay loam mottled with grayish brown. The substratum to a depth of 60 inches or more is brown, calcareous silt loam till.

These soils are used mainly for field crops, chiefly corn, soybeans, small grain, and hay.

Representative profile of Celina silt loam, 2 to 6 percent slopes, in a cultivated field in Union Township, 1½ miles south of Milford Center, one-half mile east of State Route 4 and U.S. Route 36, 450 feet north of County Road 65:

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

A2—8 to 10 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; thin dark grayish brown (10YR 4/2) coatings on ped faces.

B1—10 to 13 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; dark grayish brown (10YR 4/2) coatings on ped faces; moderately acid; clear smooth boundary.

IIB21t—13 to 17 inches; yellowish brown (10YR 6/4) silty clay loam; strong medium subangular blocky structure; firm; thin continuous dark brown (10YR 4/3) clay films on ped faces; 2 percent coarse fragments; moderately acid; gradual smooth boundary.

IIB22t—17 to 21 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) mottles; strong medium subangular and angular blocky structure; firm; thin continuous dark brown (10YR 4/3) clay films on ped faces; 5 percent coarse fragments; moderately acid; clear smooth boundary.

IIB23t—21 to 25 inches; dark brown (10YR 4/3) silty clay; many fine distinct yellowish brown (10YR 5/4) mottles and common fine faint grayish brown (10YR 5/2) mottles; strong coarse angular blocky structure; very firm; medium continuous dark grayish brown (10YR 4/2) clay films on ped faces; 5 percent coarse fragments; slightly acid; clear smooth boundary.

IIB24t—25 to 30 inches; yellowish brown (10YR 5/4) silty clay; common fine faint grayish brown (10YR 5/2) mottles; strong coarse angular blocky structure; firm; medium continuous dark grayish brown (10YR 4/2) clay films on ped faces; 5 percent coarse fragments; slightly acid; abrupt wavy boundary.

IIB3t—30 to 32 inches; brown (10YR 5/3) silty clay loam; very weak coarse subangular blocky structure; firm; thin dark grayish brown (10YR 4/2) clay films on vertical ped faces; 5 percent coarse fragments; moderately alkaline and calcareous; clear wavy boundary.

IIC—32 to 60 inches; brown (10YR 5/3) silt loam till; massive; firm; 10 percent coarse fragments consisting of dolomitic and igneous material; moderately alkaline and calcareous.

The Ap horizon is grayish brown (10YR 5/2) or dark grayish brown (10YR 4/2) and ranges from moderately acid to neutral. The B2t horizon ranges from dark brown (10YR 4/3) to dark brown (7.5YR 4/4). It is silty clay loam to clay or silty clay and is strongly acid to slightly acid. Depth to carbonates ranges from 22 to 35 inches. In some places the soil has a silt capping as much as 14 inches thick.

Celina soils are the moderately well drained members of a drainage sequence that includes the well drained Miamian soils, the somewhat poorly drained Crosby soils, and the dark colored, very poorly drained Brookston soils. Their B and C horizons are less clayey than those of Morley soils.

Crosby Series

The Crosby series consists of nearly level to gently sloping soils that are somewhat poorly drained. These soils formed in loamy, calcareous glacial till on the uplands. They are in the Darby Plain region in the southern part of the county.

In a representative profile in a wooded area, the surface layer is dark grayish brown silt loam about 3 inches thick. The subsurface layer is 4 inches of light brownish gray silt loam mottled with yellowish brown. The subsoil is 18 inches thick. In sequence from the top, it is 4 inches of brown silty clay loam mottled with gray and yellowish brown; 6 inches of yellowish brown silty clay loam mottled with gray and yellowish brown; and 8 inches of yellowish brown silty clay mottled with dark grayish brown, yellowish brown, and gray. The substratum extends to a depth of 60 inches or more. The upper 10 inches is brown and yellowish brown silt loam mottled with yellowish brown, and the lower part is brown silt loam glacial till.

If adequately drained, these soils are well suited to the crops commonly grown in the county. The principal crops are corn, soybeans, small grain, and hay.

Representative profile of Crosby silt loam, 0 to 2 percent slopes, in a wooded area in Union Township, 7½ miles south of Marysville, 1 mile south of Penn-Central Railroad tracks on State Route 38, 400 feet southeast of State Route 38.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many roots; slightly acid; abrupt smooth boundary.
A2—3 to 7 inches; light brownish gray (10YR 6/2) silt loam; few fine faint yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium platy structure; friable; strongly acid; clear smooth boundary.
B1—7 to 11 inches; brown (10YR 5/3) silty clay loam; common fine distinct gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm; strongly acid; clear smooth boundary.
IIB21t—11 to 17 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct gray (10YR 5/1) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm thin dark brown (10YR 3/3) and dark gray (10YR 4/1) clay films on vertical ped faces and on many horizontal faces; 8 percent coarse fragments; strongly acid; clear wavy boundary.
IIB22t—17 to 25 inches; yellowish brown (10YR 5/4) silty clay; common fine distinct dark grayish brown (10YR 4/2) yellowish brown (10YR 5/6) and gray (10YR 5/1) mottles; moderate and strong, coarse subangular blocky structure, very firm medium continuous very dark grayish brown (10YR 3/2) and grayish brown (2.5Y 5/2) clay films on ped faces; a few tongues of this horizon extend into the upper part of the C horizon; 8 percent coarse fragments; strongly acid; clear wavy boundary.
IIC1—25 to 35 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) silt loam; common medium distinct yellowish brown (10YR 5/6 and 5/8) mottles; massive; firm; common coarse fragments consisting of weathered limestone pebbles and cobblestones; moderately alkaline and calcareous.
IIC2—35 to 60 inches; brown (10YR 5/3) silt loam; common coarse fragments consisting of weathered limestone pebbles and cobblestones and shale material; moderately alkaline and calcareous.

The A1 horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) and dark gray (10YR 4/1), is 2 to 3 inches thick, and is moderately acid or slightly acid. In cultivated areas, the Ap horizon is dark grayish brown (10YR 4/2) and is moderately acid to neutral. The Bt horizon is dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) silty clay, clay, silty clay loam and clay loam. It ranges from strongly acid to moderately acid in the upper part and becomes less acid with increasing depth. A B3 horizon is present in some places. The C horizon is silt loam and loam. Depth to carbonates ranges from 20 to 30 inches. In some places the soil has a silt capping as much as 14 inches thick.

Crosby soils are the somewhat poorly drained members of a drainage sequence that includes the darker colored very poorly drained Brookston soils and the moderately well drained Celina soils. Their B and C horizons are less clayey and less compact than those of Blount soils. They have a lighter colored A horizon than the somewhat poorly drained Odell soils

Eel Series

The Eel series consists of nearly level, moderately well drained soils on flood plains along the major streams in the county. These soils formed in recent loamy alluvium washed from soils derived from calcareous glacial till.

In a representative profile in a pasture the surface layer is dark grayish brown silt loam 6 inches thick. The subsoil is 34 inches thick. In sequence from the top, it is 7 inches of dark grayish brown silt loam; 5 inches of brown silt loam; 7 inches of dark brown silty clay loam mottled with gray and dark yellowish brown; and 15 inches of brown silty clay loam mottled with gray. The substratum to a depth of 60 inches or more is dark gray silty clay loam mottled with dark yellowish brown and yellowish brown.

Eel soils are used for pasture and cultivated crops. Bluegrass is the common pasture grass. Corn and soybeans are the principal cultivated crops.

Representative profile of Eel silt loam in a pasture in Paris Township, 3¼ miles northwest of Marysville, three fourths mile northeast of the intersection of County Roads 191 and 139, adjacent to Otter Run:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; very dark grayish brown (10YR 3/2) coatings; moderately alkaline; abrupt smooth boundary.

B1—6 to 13 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine subangular blocky structure; friable; very dark grayish brown (10YR 3/2) coatings; moderately alkaline; abrupt smooth boundary.

B21—13 to 18 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable; dark grayish brown (10YR 4/2) coatings; moderately alkaline; clear smooth boundary.

B22—18 to 25 inches; dark brown (10YR 4/3) silty clay loam; common medium distinct gray (5YR 5/1) and dark yellowish brown (10YR 4/4) mottles; moderate coarse subangular blocky structure; firm; slightly acid; clear smooth boundary.

B23—25 to 40 inches; brown (10YR 4/3) silty clay loam; common fine distinct gray (10YR 5/1) mottles and few fine faint dark brown (10YR 4/3) mottles; moderate coarse subangular blocky structure; firm; grayish brown (2.5Y 5/2) coatings; slightly acid; clear smooth boundary.

C— 40 to 60 inches; dark gray (10YR 4/1) silty clay loam; moderate medium distinct dark yellowish brown (10YR 4/4) mottles and few medium distinct yellowish brown (10YR 5/4 and 5/6) mottles; massive; firm; charcoal fragments and a few pebbles; moderately alkaline, calcareous.

The A1 horizon is very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), and dark brown (10YR 4/3) and ranges from neutral to moderately alkaline. The B horizon is silt loam or silty clay loam and ranges from neutral to slightly acid. The C horizon is silty clay loam or gravelly loam.

Eel soils are adjacent to the well-drained Genesee soils, the somewhat poorly drained Shoals soils, and the dark colored, very poorly drained Sloan soils. They are better drained than the Algiers soils. They are lighter colored than the well-drained Ross soils.

Fox Series

The Fox series consists of nearly level to gently sloping soils that are well drained. These soils formed in loamy material 24 to 42 inches thick over stratified gravel and sand. They are mostly on glacial outwash terraces of Wisconsinan age along the major streams in the county.

In a representative profile the plow layer is dark brown silt loam 9 inches thick. The subsoil is 2 inches thick. In sequence from the top, it is 3 inches of dark brown silty clay loam; 5 inches of dark brown clay loam; and 17 inches of dark brown material that is for the most part gravelly clay. The substratum to a depth of 60 inches or more is stratified, calcareous, loose gravel and sand.

Fox soils are used mainly for farming. Corn, soybeans, small grain, and hay are the main crops. A small acreage is pasture and woodland. These soils are suited to irrigation if erosion is controlled.

Representative profile of Fox silt loam, 0 to 2 percent slopes, in a cultivated field in Allen Township, 3½ miles northwest of Milford Center, 1¼ miles northwest of the intersection of County Roads 75 and 78:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many roots; thin continuous dark brown (10YR 3/3) coatings; neutral; abrupt smooth boundary.

B1—9 to 12 inches; dark brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; many roots; thin continuous dark brown (10YR 3/3) coatings;

moderately acid; clear wavy boundary.

B21t—12 to 17 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; many roots; thin, continuous dark yellowish brown (10YR 3/4) clay films on vertical ped faces and patchy on the horizontal faces; strongly acid; clear wavy boundary.

B22t—17 to 22 inches; dark brown (7.5YR 4/2 and 7.5YR 4/4) clay; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 3/4) clay films on all ped surfaces; 15 percent coarse fragments; moderately acid; gradual wavy boundary

IIB23t—22 to 28 inches; dark brown (7.5YR 4/2) gravelly clay; weak medium prismatic structure parting to weak medium subangular blocky; firm; thin continuous dark yellowish brown (10YR 3/4) clay films; 20 percent coarse fragments; moderately acid; gradual wavy boundary

IIB24t—28 to 30 inches; dark brown (7.5 YR 4/2) clay; weak medium subangular blocky structure; very firm; thin continuous very dark brown (10YR 2/2) clay films; less than 10 percent coarse fragments; slightly acid; gradual wavy boundary.

IIB3t—30 to 34 inches; dark brown (10YR 3/3) gravelly loam; weak, medium and coarse, subangular blocky structure; friable; thin patchy very dark brown (10YR 2/2) clay films on gravel; 40 percent coarse fragments; moderately alkaline and calcareous; diffuse irregular boundary.

IIC—34 to 60 inches; brown (10YR 5/3) and grayish brown (10YR 5/2) stratified sand and fine gravel; single grained; loose; moderately alkaline and calcareous.

The Ap horizon is dark brown (10YR 4/3) or dark grayish brown (10YR 4/2) and is 6 to 9 inches thick. The B1 horizon is silty clay loam or fine silt loam. The IIB2t horizon is dark brown (7.5YR 4/4), brown (7.5YR 4/2), and dark reddish brown (5YR 3/3) and dominantly is clay loam, gravelly clay loam gravelly clay, or clay. Irregular tongues from the IIB2t horizon commonly extend about 2 feet into the IIB3 and IIC horizons. The IIB2t horizon ranges from slightly acid to strongly acid. Depth to calcareous gravel and sand ranges from 24 to 42 inches.

The Fox soils in this county have a higher content of clay in the upper 20 inches of the B horizon than is defined as the range for the series. This slight difference does not greatly influence the usefulness or behavior of the soils.

Fox soils commonly are adjacent to Homer and Lippincott soils. They are well drained, but Homer soils are somewhat poorly drained. They are lighter colored than Lippincott soils.

Genesee Series

The Genesee series consists of nearly level, well drained soils on flood plains along the major streams in the county. These soils formed in recent loamy alluvium washed from areas where the soils were derived mainly from calcareous glacial till.

In a representative profile in a pasture, the surface layer is very dark grayish brown silt loam 13 inches thick. The subsoil is 31 inches thick. In sequence from the top, it is 16 inches of very dark grayish brown silt loam and 15 inches of dark grayish brown silt loam. The substratum to a depth of 60 inches or more is brown silt loam.

These soils are used for pasture and crops. Bluegrass is the common pasture grass. Corn and soybeans are the principal cultivated crops.

Representative profile of Genesee silt loam in a pasture in Liberty Township 1 mile Northwest of Raymond, 1,700 feet east of County Road 238-A along south bank of Mill Creek:

A1— 0 to 13 inches; very dark grayish brown (10YR 3/2) silt loam; dark grayish brown (10YR 4/2) rubbed; weak fine granular structure; friable; neutral; gradual smooth boundary.

B1—13 to 29 inches; very dark grayish brown (10YR 3/2) silt loam; dark grayish brown (10YR 4/2) rubbed; moderate medium granular structure; friable; neutral; gradual smooth boundary.

B2—29 to 44 inches; dark grayish brown (10YR 4/2) silt loam; moderate coarse granular structure; friable; moderately alkaline, gradual smooth boundary

C—44 to 60 inches; brown (10YR 4/3) silt loam; massive; friable; moderately alkaline, calcareous.

The A horizon is neutral to moderately alkaline. The B horizon is dominantly silt loam but ranges to silty clay loam. It is neutral to moderately alkaline. The C horizon typically is silt loam, but in some places it is gravelly silt loam that has sandy layers. This horizon is moderately alkaline or calcareous.

The Genesee soils in this county generally do not have carbonates within a depth of 40 inches, which is outside the range defined for the series. This slight difference does not greatly influence the use or behavior of these soils.

Genesee soils are adjacent to the moderately well drained Eel soils, the somewhat poorly drained Shoals soils, and the dark-colored, very poorly drained Sloan soils. They are better drained than Algiers soils, and are lighter colored than Ross soils.

Henshaw Series

The Henshaw series consists of nearly level soils that are somewhat poorly drained. These soils formed in silty lacustrine material on low terraces along the major streams in the county.

In a representative profile in a cultivated area, the plow layer is dark grayish brown silt loam 8 inches thick. The subsoil is 36 inches of yellowish brown silty clay loam mottled with gray, grayish brown, and olive brown. The substratum to a depth of 60 inches or more is gray silty clay loam mottled with yellowish brown.

These soils are used for crops commonly grown in the county. Corn, soybeans, small grain, and hay are the main crops.

Representative profile of Henshaw silt loam, 0 to 2 percent slopes, in a cultivated area in Jackson Township, 2½ miles west of Essex, 1,452 feet south of State Route 739, and 1,518 feet east of County Road 338:

Ap— 0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; moderately alkaline; abrupt smooth boundary.

B1t—8 to 13 inches; yellowish brown (10YR 5/4) silty clay loam; medium distinct gray (10YR 5/1) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; slightly sticky and plastic when wet; thin patchy gray (10 YR 5/1) clay films; neutral; clear wavy boundary.

B21tg—13 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic when wet; medium continuous gray (10YR 5/1) clay films; common medium distinct very dark grayish brown (10YR 3/2) oxide stains; neutral; clear wavy boundary.

B22tg—23 to 30 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic when wet; medium distinct very dark grayish brown (10YR 3/2) oxide stains; moderately alkaline; clear wavy boundary.

B3t—30 to 44 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm sticky and plastic when wet; medium discontinuous gray (10YR 5/1) clay films; common medium distinct very dark grayish brown (10YR 3/2) oxide stains; ½- and 1-inch layers of silty clay; moderately alkaline; gradual smooth boundary.

C—44 to 60 inches; gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; massive; firm; moderately alkaline.

The Ap horizon is dark grayish brown (10YR 4/2 and 2.5Y 4/2). The B1 horizon is yellowish brown (10YR 5/4 and 10YR 5/6). The B2t horizon is silty clay loam and ranges from 30 to 35 percent clay. Depth to the C horizon ranges from 35 to 45 inches.

The Henshaw soils in this county differ from Henshaw soils elsewhere in having a few gray mottles directly below the plow layer and a neutral to moderately alkaline B2 horizon, which is outside the range defined for the series. These differences do not greatly influence the usefulness or behavior of these soils in the county.

Henshaw soils commonly are adjacent to the well drained Genesee soils and the moderately well drained Eel soils.

Homer Series

The Homer series consists of nearly level soils that are somewhat poorly drained. These soils formed in loamy outwash material underlain by sandy and gravelly material at a depth of 30 to 42 inches. They are on outwash terraces along the major streams in the county.

In a representative profile in a cultivated area, the plow layer is grayish brown silt loam 9 inches thick. The subsoil is 25 inches thick. In sequence from the top, it is 3 inches of grayish brown silty clay loam mottled with dark yellowish brown and gray; 10 inches of yellowish brown clay mottled with grayish brown and yellowish brown; and 12 inches of yellowish brown gravelly clay loam mottled with dark gray. The substratum extends to a depth of 60 inches or more. The upper 4 inches is yellowish brown gravelly loam, and the lower part is stratified, grayish brown gravel and sand.

These soils are used for the crops commonly grown in the county, mainly corn, soybeans, small grain, and hay.

Representative profile of Homer silt loam in a cultivated area in Allen Township, 2½ miles southwest of Allen Center, 3,630 feet north of State Route 245, 530 feet east of County Road 163:

Ap1— 0 to 6 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Ap2—6 to 9 inches; grayish brown (10YR 5/2) silt loam; few fine faint yellowish brown (10YR 5/4) mottles; massive; friable; slightly acid; abrupt smooth boundary.

B1g—9 to 12 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) and gray (10YR 5/1) mottles; weak medium subangular blocky structure; firm; moderately acid; clear smooth boundary.

B2tg—12 to 22 inches; yellowish brown (10YR 5/4) clay; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; very firm; thin continuous dark grayish brown (2.5Y 4/2) and very dark grayish brown (2.5Y 3/2) clay films on ped surfaces; slightly acid; clear irregular boundary.

IIB3tg—22 to 34 inches; yellowish brown (10YR 5/4) gravelly clay loam; common fine distinct dark gray (10YR 4/1) mottles; weak very coarse subangular blocky structure; firm; thin continuous dark grayish brown (2.5Y 4/2) clay film on gravel and peas; slightly acid in upper part changing to moderately alkaline to calcareous in the lower part; clear wavy boundary.

IIC1—34 to 38 inches; yellowish brown (10YR 5/8) gravelly loam; single grained; friable; moderately alkaline and calcareous.

IIC2—38 to 60 inches; grayish brown (2.5Y 5/2) stratified gravel and sand; loose; moderately alkaline and calcareous.

The Ap horizon is dark gray (10YR 4/1), grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2). The B2tg horizon is grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) mottled with gray (10YR 5/1), grayish brown (10YR 5/2), and yellowish brown (10YR 5/6). It is clay, gravelly clay, and gravelly clay loam and ranges from slightly acid to moderately acid. The weighted average clay content of the Bt horizon is 35 to 40 percent. Most gravel in the IIB3 horizon is dolomite.

The Homer soils in this county have a slightly higher content of clay in the B2tg horizon than is typical for the series. This difference does not greatly influence the usefulness or behavior of these soils.

Homer soils are the somewhat poorly drained members of a drainage sequence that includes the well-drained Fox soils and the dark-colored, very poorly drained Lippincott soils. The A horizon is lighter colored than that of Kane soils.

Kane Series

The Kane series consists of nearly level soils that are somewhat poorly drained. These soils formed in loamy outwash material underlain by stratified sand and gravel at a depth of 35 to 40 inches. They are on low outwash terraces along the major streams in the county and are subject to occasional flooding.

In a representative profile in a cultivated area the surface layer is very dark grayish brown silt loam 13 inches thick. The subsoil is 26 inches thick. In sequence from the top, it is 4 inches of dark grayish brown silty clay loam mottled with yellowish brown; 11 inches of dark grayish brown clay loam mottled with strong brown; 3 inches of light olive brown clay; and 8 inches of grayish brown and olive yellow gravelly silt loam. The substratum to a depth of 60 inches or more is stratified, grayish brown sand and gravel.

Kane soils are used for crops commonly grown in the county, mainly corn, soybeans, small grain, and hay.

Representative profile of Kane silt loam in a cultivated field in Allen Township, 2 miles southwest of Allen Center, 2,000 feet Southwest of intersection of State Route 245 and County Road 167:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

A1—8 to 13 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; very dark grayish brown (10YR 3/2) organic coatings on granule faces; slightly acid; clear smooth boundary.

B1g—13 to 17 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few very dark gray (10YR 3/1) organic coatings on vertical ped faces; moderately acid; clear smooth boundary.

B21tg—17 to 23 inches; dark grayish brown (10YR 4/2) clay loam; common fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; moderate, fine and medium, subangular blocky structure; firm; few thin patchy dark gray (10YR 4/1) clay films on vertical ped faces; moderately acid; clear wavy boundary.

B22tg—23 to 28 inches; dark grayish brown (10YR 4/2) clay loam; common fine distinct strong brown (7.5YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; thin continuous dark gray (10YR 4/1) clay films on vertical ped faces; strongly acid; clear wavy boundary.

B23tg—28 to 31 inches; light olive brown (2.5YR 5/4, 5/6) clay; weak, medium and coarse, subangular blocky structure; very firm; thin continuous very dark gray (N 3/9) clay films on vertical and many horizontal ped faces; slightly acid; clear irregular boundary.

IIB3—31 to 39 inches; grayish brown (2.5Y 5/2) and olive yellow (2.5Y 6/6) gravelly silt loam; massive; friable; 25 percent coarse fragments consisting mainly of partly weathered limestone cobblestones and pebbles; moderately alkaline and calcareous; gradual irregular boundary.

IIC—39 to 60 inches; grayish brown (2.5Y 5/2) stratified sand and gravel; loose; calcareous.

Depth to stratified sand and gravel ranges from 35 to 40 inches. The A horizon ranges from 10 to 15 inches in thickness and is black (10YR 2/1), very dark gray (10YR 3/1), and very dark grayish brown (10YR 3/2). The B2 horizon ranges from dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4 and 5/6). It is silty clay loam, gravelly clay loam, clay loam, and clay and is strongly to slightly acid. The weighted average clay content of the B2 horizon is 28 to 35 percent. The IIB3 horizon ranges from 6 to 12 inches in thickness and is 10 to 30 percent coarse fragments.

Kane soils are the somewhat poorly drained members of a drainage sequence that includes the well drained Warsaw soils. They commonly are adjacent to the lighter colored somewhat poorly drained Homer soils.

Kendallville Series

The Kendallville series consists of nearly level to gently sloping soils that are well drained. These soils formed in loamy outwash material and the underlying, compact, calcareous glacial till. They are on till plains and moraines.

In a representative profile in a cultivated area, the plow layer is dark brown silt loam 9 inches thick. The subsoil is 26 inches thick. In sequence from the top, it is 11 inches of reddish brown clay loam; 9 inches of reddish brown gravelly clay; and 6 inches of yellowish brown clay loam. The substratum to a depth of 60 inches or more is light olive brown clay loam glacial till mottled with gray.

Kendallville soils are used mainly for field crops. Corn, soybeans, small grain, and hay are the main crops.

Representative profile of Kendallville silt loam, 2 to 6 percent slopes, in a cultivated area in Leesburg Township, 5 miles southwest of Richwood, one-half mile west of intersection of County Roads 199 and 214:

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

B21t—9 to 14 inches; reddish brown (5YR 4/4) clay loam; moderate, fine and medium, subangular blocky structure; firm; sticky when wet; few roots; thin patchy dark reddish brown (5YR 3/4) clay films; 10 percent fine gravel; very strongly acid; clear smooth boundary.

B22t—14 to 20 inches; reddish brown (5YR 4/4) clay loam; moderate, medium and coarse, subangular blocky structure; firm; sticky when wet; few roots; thin continuous dark reddish brown (5YR 3/3) clay films; 10 percent fine gravel; very strongly acid; clear wavy boundary.

B23t—20 to 25 inches; reddish brown (5YR 5/4) gravelly clay; weak coarse subangular blocky structure; friable; sticky when wet; few roots; thin continuous dark reddish brown (5YR 3/3) clay films; 26 percent fine gravel; very strongly acid; clear wavy boundary.

B31t—25 to 29 inches; reddish brown (5YR 5/4) gravelly clay; weak coarse subangular blocky structure; friable; sticky when wet; thin continuous dark reddish brown (5YR 3/2) clay films; 25 percent coarse fragments consisting mostly of dolomitic gravel and cobbles; slightly acid; clear irregular boundary.

IIB32—29 to 35 inches; yellowish brown (10YR 5/4) clay loam; weak coarse subangular blocky structure; friable; 5 percent glacial pebbles; neutral; clear irregular boundary.

IIC—35 to 60 inches; light olive brown (2.5Y 5/4) clay loam; few fine faint gray (N 5/0) mottles; massive; firm; 5 percent coarse fragments; calcareous glacial till.

Depth to the IIC horizon ranges from 25 to 40 inches. The Ap horizon is dark grayish brown (10YR 4/2) and dark brown (10YR 4/3). A silty clay loam B1 horizon is present in some profiles. The B2t horizon is moderately acid to very strongly acid and is silty clay loam, clay loam, and gravelly clay. The B22t horizon has hues of 10YR to 5YR, values of 4 and 5, and chroma of 4.

In most places Kendallville soils are near Fox soils. They are underlain by compact glacial till, whereas Fox soils are underlain by stratified sand and gravel. Their B horizon is more gravelly than that of Miamian soils.

Lippincott Series

The Lippincott series consists of nearly level soils that are very poorly drained. These soils formed in loamy outwash materials underlain by stratified sand and gravel at a depth of 24 to 36 inches. They are on low outwash terraces mainly along Big Darby Creek.

In a representative profile in a cultivated area, the plow layer is black silty clay loam 7 inches thick. The subsoil is 29 inches thick. In sequence from the top, it is 4 inches of black silty clay loam; 6 inches of very dark gray silty clay mottled with yellowish brown; 8 inches of dark grayish brown silt loam mottled with yellowish brown; and 11 inches of grayish brown very gravelly loam mottled with yellowish brown. The substratum to a depth of 60 inches or more is stratified sand and gravel.

Lippincott soils are used mainly for corn and soybeans.

Representative profile of Lippincott silty clay loam in a cultivated area in Union Township, 3 miles southwest of Milford

Center, 1,050 feet north of U.S. Route 36, 1,360 feet west of Treacle Creek:

Ap— 0 to 7 inches; black (10YR 2/1) silty clay loam; moderate medium granular structure; friable; common roots; slightly acid; abrupt smooth boundary.
B21t—7 to 11 inches; black (10YR 2/1) silty clay loam; moderate medium angular blocky structure; firm; common roots; thin patchy very dark gray (10YR 3/1) clay films on ped vertical faces; slightly acid; clear wavy boundary.
B22tg—11 to 17 inches; very dark gray (10YR 3/1) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; common roots; thin continuous dark gray (10YR 4/1) clay films on ped vertical faces; slightly acid; clear irregular boundary.
B23tg—17 to 25 inches; dark grayish brown (2.5Y 4/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; very firm; thin continuous dark gray (10YR 4/1) clay films on ped faces and in root channels; neutral; clear wavy boundary.
IIB3—25 to 36 inches; grayish brown (2.5Y 5/2) very gravelly loam; many fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; 50 percent coarse fragments consisting of partly weathered dolomitic gravel; moderately alkaline and weakly calcareous; clear wavy boundary.
IIC—36 to 60 inches; gray (5Y 5/1) stratified fine gravel and sand; single grained; loose; moderately alkaline and calcareous.

Depth to stratified sand and gravel ranges from 24 to 36 inches. The Ap horizon is very dark gray (10YR 3/1) and black (10YR 2/1). The B23tg horizon is dark grayish brown (2.5Y 4/2) and grayish brown (2.5Y 5/2). The B2 horizon is silty clay loam, silty clay, and clay loam. The weighted average clay content of the Bt horizon is 35 to 45 percent. The IIB3 horizon ranges from 6 to 12 inches in thickness. It is 25 to 60 percent dolomitic pebbles and cobblestones.

Lippincott soils are the very poorly drained members of a drainage sequence that includes the well-drained Fox soils and the somewhat poorly drained Homer soils. They are shallower over sand and gravel than Westland soils and have a more clayey B horizon.

Miamian Series

The Miamian series consists of gently sloping to very steep soils that are well drained. These soils formed in loamy calcareous glacial till on uplands. They are on the Darby Plain, in the southern part of Union County.

In a representative profile in a cultivated area, the plow layer is dark grayish brown silt loam 7 inches thick. The subsoil is 23 inches thick. In sequence from the top, it is 4 inches of brown silt loam; 9 inches of dark yellowish brown clay; 4 inches of yellowish brown clay; and 6 inches of yellowish brown loam. The substratum to a depth of 60 inches or more is yellowish brown loam.

Miamian soils are used mainly for corn, soybeans, small grain, and hay.

Representative profile of Miamian silt loam, 2 to 6 percent slopes, in a cultivated area in Allen Township, 1 mile northeast of North Lewisburg, one-fourth mile northeast of intersection of County Roads 162 and 164:

Ap— 0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak and moderate fine granular structure; friable; slightly acid; abrupt smooth boundary.
B1—7 to 11 inches; brown (7.5YR 5/4) silt loam; moderate fine subangular blocky structure; friable; moderately acid; clear smooth boundary.
B21t—11 to 15 inches; dark yellowish brown (10YR 4/4) clay; moderate and strong, fine and medium subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on all ped surfaces; strongly acid; clear smooth boundary.
B22t—15 to 20 inches, dark yellowish brown (10YR 4/4) clay; moderate and strong, medium and coarse subangular blocky structure; firm; medium continuous dark brown (7.5YR 4/4) clay films on all ped surfaces, strongly acid, clear wavy boundary.

B23t—20 to 24 inches; yellowish brown (10YR 5/4) clay; weak coarse subangular blocky structure; very firm; medium continuous dark brown (7.5YR 4/4) clay films on all ped surfaces; slightly acid; clear irregular boundary.

B3t—24 to 30 inches; yellowish brown (10YR 5/4) loam; weak coarse subangular blocky structure; friable; medium continuous dark brown (10YR 4/3) clay films on vertical and many horizontal ped faces; 8 percent cobblestones and pebbles mostly of dolomite; moderately alkaline and calcareous; clear irregular boundary.

C—30 to 60 inches; yellowish brown (10YR 5/4) loam; massive; friable; 8 percent cobblestones and pebbles mostly of dolomite; moderately alkaline and calcareous.

Depth to carbonates ranges from 18 to 30 inches. The B2 horizon is yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) and has clay films of dark brown (7.5YR 4/2 and 7.5YR 4/4). It is clay and clay loam and is strongly acid in the upper part and neutral in the lower part. The B3 horizon ranges from 5 to 8 inches in thickness and has hues of 10YR and 7.5YR, values of 4 and 5, and chroma of 4. Depth to the C horizon ranges from 20 to 37 inches.

Miamian soils are the well drained members of drainage sequence that includes the moderately well drained Celina soils, the somewhat poorly drained Crosby soils, and the very poorly drained Brookston soils. Their B and C horizons are less clayey than those of the Morely soils.

Montgomery Series

The Montgomery series consists of nearly level soils that are very poorly drained. These soils formed in clayey material on low stream terraces and in depressions on uplands adjacent to Big Swale Creek, north of Richwood.

In a representative profile in a cultivated area, the plow layer is very dark grayish brown silty clay loam 9 inches thick. The upper part of the subsoil is 50 inches thick. In sequence from the top, it is 8 inches of very dark gray silty clay mottled with dark yellowish brown and 49 inches of dark gray silt loam. The lower part of the subsoil and the substratum, to a depth of 70 inches or more, is gray silty clay mottled with yellowish brown.

Montgomery soils are used mostly for corn and soybeans.

Representative profile of Montgomery silty clay loam, in a cultivated field in Paris Township, 3 miles north of Marysville, one-half mile southwest of intersection of State Route 31 and County Road 128:

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak medium granular structure in upper part of horizon and massive in lower part; friable; neutral; abrupt smooth boundary.

B21g—9 to 17 inches; very dark gray (N 3/0) silty clay; common fine distinct dark yellowish brown (l0YR 4/4) mottles; moderate fine angular blocky structure; firm; thin patchy very dark gray (N 3/0) clay films on vertical ped surfaces; slightly acid; clear wavy boundary.

B22g—17 to 26 inches, dark gray (N 4/0) silty clay; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to strong medium angular blocky; firm; thin continuous very dark gray (N 3/0) clay films on vertical ped surfaces; neutral; clear wavy boundary.

B23g—26 to 38 inches; dark gray (10YR 4/1) silty clay; many fine distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to strong medium angular blocky; very firm; thin continuous dark gray (N 4/0) clay films on vertical ped surfaces; neutral; gradual wavy boundary.

B24g—38 to 59 inches; dark gray (10YR 4/1) silty clay; many fine distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate coarse angular blocky; very firm; thin patchy dark - gray (N 4/0) clay films which disappear with depth on vertical ped surfaces; moderately alkaline; gradual wavy boundary.

B3&C—59 to 70 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/4 and 5/6) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; very firm; moderately alkaline.

The dark-colored layer ranges from 10 to 18 inches in thickness and is very dark grayish brown (10YR 3/2), very dark gray (10YR 3/1), and black (10YR 2/1). The B2g horizon is very dark gray (N 3/0), dark gray (N 4/0), and grayish brown (2.5Y 5/2), is silty clay, clay, and silty clay loam and is slightly acid to moderately alkaline. The C horizon is gray (10YR 6/1, 10YR 5/1) and dark gray (10YR 4/1). It ranges from neutral to moderately alkaline and is calcareous.

The Montgomery soils in this county have a thicker solum and are deeper over carbonates than is typical for the series. These differences do not greatly influence the use or behavior of these soils.

Montgomery soils commonly are near the Pewamo soils. In contrast, they are underlain by lacustrine material, whereas Pewamo soils are underlain by glacial till.

Morley Series

The Morley series consists of gently sloping to very steep soils that are moderately well drained. These soils formed in calcareous glacial till of silty clay loam or clay loam texture. They are on till plains and moraines. They are moderately deep to deep over compact till.

In a representative profile the plow layers is dark grayish brown silt loam 7 inches thick. The subsoil is 31 inches thick. In sequence from the top, it is 3 inches of yellowish brown silty clay loam; 14 inches of dark yellowish brown clay mottled with grayish brown and dark grayish brown; 5 inches of dark brown silty clay loam mottled with grayish brown; and 9 inches of dark yellowish brown and dark grayish brown silty clay loam. The substratum to a depth of 60 inches or more is dark yellowish brown and dark gray silty clay loam.

These soils are used mainly for corn, soybeans, small grain, hay, and other field crops.

Representative profile of Morley silt loam, 2 to 6 percent slopes, moderately eroded, in a cultivated field in Taylor Township, 3 2/3 miles northwest of Marysville, 1,980 feet northwest of intersection of State Route 31 and County Road 128.

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

B1t—7 to 10 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common roots; thin patchy brown (10YR 5/3) clay films on ped surfaces; silt coatings can be seen on dried peds; moderately acid; clear smooth boundary.

B21t—10 to 13 inches; dark yellowish brown (10YR 4/4) clay; many fine faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common roots; thin continuous dark brown (10YR 4/3) clay films on all ped surfaces; strongly acid; clear smooth boundary.

B22t—13 to 17 inches; dark yellowish brown (10YR 4/4) clay; few fine faint grayish brown (10YR 5/2) mottles; moderate, medium and coarse, subangular blocky structure; firm; few roots; thin continuous dark brown (10YR 4/3) clay films on all ped faces; few fine distinct black (10YR 2/1) oxide stains on horizontal ped surfaces; a few small fragments of shale; slightly acid; clear wavy boundary.

B23t—17 to 24 inches; dark yellowish brown (10YR 4/4) clay; few fine distinct dark grayish brown (10YR 4/2) mottles; weak coarse prismatic structure parting to moderate coarse angular blocky; firm; few roots; thin continuous dark grayish brown (10YR 4/2) clay films on all ped surfaces; a few fragments of shale; neutral; gradual wavy boundary.

B31t—24 to 29 inches; dark-brown (10YR 4/3) silty clay loam; common fine distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; very firm; few roots; thin continuous dark grayish brown (10YR 4/2) clay films on vertical and some horizontal ped faces; few fragments of shale; moderately alkaline and calcareous; gradual wavy boundary.

B32t—29 to 38 inches; dark yellowish brown (10YR 4/4) and dark grayish brown (10YR 4/2) silty clay loam; weak coarse subangular blocky structure; very firm; thin continuous grayish brown (10YR 5/2) calcareous clay films on vertical ped faces; few fragments of shale and limestone pebbles; moderately alkaline and calcareous; gradual irregular boundary.

C—38 to 60 inches; dark yellowish brown (10YR 4/4) and dark gray (10YR 4/1) silty clay loam; weak thick platy structure; very firm; thin continuous grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) calcareous clay films on vertical ped faces and cracks in the till mass; few fragments of shale; moderately alkaline and calcareous.

The Ap horizon is dark grayish brown (10YR 4/2) or dark brown (10YR 4/3) and is slightly acid to neutral. In natural wooded areas the A1 horizon is dark gray (10YR 4/1) or very dark gray (10YR 3/1) and is 2 to 6 inches thick. It is commonly underlain by 3 to 5 inches of the A2 horizon. The B2t horizon is dark yellowish brown (10YR 4/4), brown (10YR 5/3), and yellowish brown (10YR 5/4 and 5/6) . Clay films on ped faces are dark brown (10YR 4/3 or 3/3) in the upper part of the horizon and dark grayish brown (10YR 4/2) in the lower part. The B2t horizon ranges from 10 to 19 inches in thickness and from very strongly acid in the upper part to neutral in the lower part. Depth to the B3 horizon ranges from 19 to 28 inches. Depth to carbonates mostly coincides with the depth to the B3 horizon, but is typically about 24 inches. The C horizon has hues of 10YR and 2.5YR, values of 4 and 5, and chroma of 4. The calcareous clay films range from gray (10YR 5/1) to light gray (10YR 7/1) and coat most vertical ped faces and cracks. In some places the soil has a silt capping as much as 14 inches thick.

The Morley soils in this county have 2-chroma mottles in the upper 10 inches of the Bt horizon, which is outside the defined range for the series. This slight difference does not greatly influence the usefulness or behavior of these soils.

Morley soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Blount soils and the darker colored, very poorly drained Pewamo and poorly drained Wetzel soils. They are not so well drained as the well-drained Miamian soils and are underlain by clay loam till containing shale fragments, whereas Miamian soils are underlain by loam textured till. Their B horizon is less clayey than that of the St. Clair soils.

Muskego Series

The Muskego series consists of organic soils that are naturally very poorly drained. These soils are saturated most of the year unless artificially drained. They formed in more than 16 inches of organic material accumulated from the partly decomposed remains of trees, fibrous grasses, sedges, and reeds. They are in low-lying, swampy basins in the till plains, mostly in the southern part of the county.

In a representative profile in a pasture, the surface layer is black muck 13 inches thick. Beneath this is 8 inches of dark brown mucky peat; 15 inches of dark grayish brown mucky peat; and 24 inches of olive-gray earthy material.

These soils are used for crops and pasture. Corn and soybeans are the principal crops.

Representative profile of Muskego muck in a pasture area in Union Township, near village of Irwin, three-fourths mile southwest of the intersection of State Route 161 and an abandoned railroad right-of-way in Irwin:

Oa1—0 to 9 inches; black (10YR 2/1) sapric material muck; moderate fine granular structure; friable; slightly acid; gradual smooth boundary.

Oa2—9 to 13 inches; black (10YR 2/1) sapric material muck; weak fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

Oa3—13 to 21 inches; dark brown (7.5YR 3/2) sapric material mucky peat; breaks out in chunks; friable; slightly acid; gradual smooth boundary.

Oa4—21 to 36 inches; dark grayish brown (2.5Y 4/2) sapric material mucky peat that has some woody fragments; massive; friable; neutral; clear smooth boundary.

Lco—36 to 60 inches; olive-gray (5Y 4/2) coprogenous earth; massive; some herbaceous plants remain visible; neutral.

The Oa3 horizon is dark brown (7.5YR 3/2) or black (10YR 2/1). The sapric material ranges from moderately acid to neutral. The coprogenous earth is neutral or moderately alkaline.

Nappanee Series

The Nappanee series consists of nearly level to gently sloping soils that are somewhat poorly drained. These soils formed in calcareous, clayey glacial till that has been modified in the upper part by water action at the bottom of former lakes. They are in the western part of the county.

In a representative profile in a cultivated area, the plow layer is dark grayish brown silt loam 7 inches thick. The subsoil is 18 inches thick. In sequence from the top, it is 2 inches of dark grayish brown silty clay loam; 4 inches of gray and dark gray silty clay mottled with yellowish brown; and 12 inches of dark grayish brown silty clay mottled with gray and dark brown. The substratum is 14 inches of brown and dark grayish brown silty clay and 21 inches or more of dark grayish brown silty clay.

Nappanee soils are used mostly for pasture and crops. The main crops are corn, soybeans, small grain, and hay.

Representative profile of Nappanee silt loam, 0 to 2 percent slopes, in a cultivated area in Liberty Township, 4 miles southwest of Raymond, three-fourth mile southwest of intersection of County Roads 179 and 258.

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

B1g—7 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam; few medium distinct yellowish brown (10YR 5/6) and gray (10YR 5/1) mottles; moderate medium subangular blocky structure; firm; sticky and plastic when wet, few thin patchy clay films on ped surfaces; common roots; moderately acid; clear, wavy boundary.

B21tg—9 to 13 inches; gray (10YR 5/1) and dark gray (10YR 4/1) silty clay; many medium distinct yellowish brown (10YR 5/4, 5/6) mottles; moderate medium subangular blocky structure; firm; sticky and plastic when wet; common roots; thin continuous clay films on ped surfaces; strongly acid; clear irregular boundary.

IIB22tg—13 to 20 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine distinct gray (10YR 5/1) and dark brown (10YR 4/3) mottles; moderate medium prismatic structure parting to weak coarse subangular blocky; firm; sticky and plastic when wet; few roots; thin continuous clay films on ped surfaces; 1 percent pebbles; neutral; clear irregular boundary.

IIB3t—20 to 25 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine distinct dark brown (10YR 4/3) and gray (10YR 5/1) mottles; moderate medium prismatic structure parting to weak medium and coarse subangular blocky; firm; sticky and plastic when wet; thin continuous clay films on some vertical ped faces; 1 percent pebbles; neutral; clear irregular boundary.

IIC1—25 to 39 inches; brown (10YR 4/3) and dark grayish brown (2.5Y 4/2) silty clay; weak coarse prismatic structure; very firm; sticky and plastic when wet; thin patchy gray (10YR 5/1) clay films on some vertical ped faces; 1 percent pebbles; irregular boundary; moderately alkaline and calcareous.

IIC2—39 to 60 inches; dark grayish brown (10YR 4/2 and 2.5Y 4/2) silty clay; massive; very firm; sticky and plastic when wet; thin patchy gray (10YR 5/1) clay films on some vertical ped faces; 1 percent pebbles; moderately alkaline and calcareous.

The A and B horizons range from 22 to 32 inches in thickness. The Ap horizon is grayish brown (10YR 4/2) and dark grayish brown (2.5Y 4/2). In wooded areas the A1 horizon ranges from dark gray (10YR 4/1) to very dark grayish brown (10YR 3/2 or 2.5Y 3/2) and is 2 or 3 inches thick. The A2 horizon is 3 to 5 inches thick. A B1 horizon 2 or 3 inches thick is present in wooded areas. The B2 horizon is gray (10YR 5/1), dark gray (10YR 4/1), dark grayish brown (2.5Y 4/2 and 10YR 4/2), and light brownish gray (2.5Y 6/2) mottled with gray (10YR 5/1 and 10YR 6/1), yellowish brown (10YR 5/4 and 10YR 5/6), and dark brown (10YR 4/3). More than 40 percent of the mottling has high chroma. The B2 horizon ranges from 11 to 24 inches in thickness and is silty clay and clay. The B horizon ranges from strongly acid in the upper part to neutral in the lower part.

Nappanee soils are the somewhat poorly drained members of a drainage sequence that includes moderately well drained St. Clair soils and the very poorly drained Paulding soils. Their B and C horizons are more clayey than those of Crosby or Blount soils.

Odell Series

The Odell series consists of nearly level soils that are somewhat poorly drained. These soils formed in a thin silt mantle and the underlying loamy calcareous glacial till on uplands. They are in the Darby Plain region in the southern part of the county.

In a representative profile in a cultivated area, the plow layer is very dark grayish brown silt loam 6 inches thick. The subsoil is 21 inches thick. In sequence from the top, it is 4 inches of very dark grayish brown silty clay loam; 6 inches of dark brown clay loam mottled with yellowish brown; 2 inches of dark brown silt loam mottles with light olive brown; and 9 inches of olive gray loam mottled with yellowish brown. The substratum to a depth of 60 inches or more is dark grayish brown loam mottled with yellowish brown and gray.

Odell soils are used for crops commonly grown in the county. Corn, soybeans, small grain, and hay are the main crops.

Representative profile of Odell silt loam, 0 to 2 percent slopes, in a cultivated area in Darby Township, 2 miles southwest of Unionville Center, three-fourths mile northwest of the intersection of State Route 161 and County Road 44:

Ap— 0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

B21—6 to 10 inches; very dark grayish brown (10YR 3/2) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; strong fine subangular blocky structure; firm; moderately acid; clear smooth boundary.

IIB22t—10 to 16 inches; dark brown (10YR 4/3) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; strong fine subangular blocky structure; very firm; thin continuous dark grayish brown (10YR 4/2) clay films on all ped faces; 3 percent coarse fragments; moderately acid; clear wavy boundary.

IIB23t—16 to 18 inches; dark brown (10YR 4/3) silt loam; many medium distinct light olive brown (2.5Y 5/6) mottles; weak fine subangular blocky structure; firm thin patchy dark grayish brown (10YR 4/2) clay films on all ped faces; 5 percent coarse fragments; slightly acid; clear wavy boundary.

IIB3t—18 to 27 inches; olive-gray (5Y 5/2) loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; thin patchy dark grayish brown (10YR 4/2) clay films on vertical ped faces; 5 percent coarse fragments; moderately alkaline; clear wavy boundary.

IIC—27 to 60 inches; dark grayish brown (10YR 4/2) loam; common fine distinct yellowish brown (10YR 5/6) and gray (10YR 5/1) mottles; massive; firm; 5 percent coarse fragments; moderately alkaline and calcareous.

Depth to carbonates ranges from 24 to 36 inches. In most places the soil has a silt capping as much as 14 inches thick. The dark-colored layer ranges from 10 to 14 inches in thickness and is black (10YR 2/1), very dark brown (10YR 2/2), and very dark grayish brown (10YR 3/2). The B2t horizon is dark brown (10YR 4/3) or yellowish brown (10YR 5/4) and has mottles that have hues of 10YR and 2.5Y, values of 4 to 6, and chroma of 2. It is moderately acid to neutral and is silt loam and silty clay loam.

Odell soils are near Crosby soils. They have a darker-colored A horizon than Crosby soils. Both are somewhat poorly drained.

Paulding Series

The Paulding series consists of nearly level soils that are very poorly drained. These soils formed in clayey glacial till that has been modified to a moderate depth by water action at the bottom of former lakes. They are in depressions in the uplands in the western part of the county.

In a representative profile in a cultivated area, the plow layer is dark gray and dark grayish brown silty clay 7 inches thick. The subsoil is 45 inches thick. In sequence from the top, it is 35 inches of dark gray clay mottled with stronger brown and yellowish brown and 10 inches of yellowish brown and dark yellowish brown silty clay. The substratum to a depth of 62 inches or more is dark yellowish brown silty clay.

Paulding soils are used mainly for pasture and crops. The principal crops are corn, soybeans, small grain, and hay.

Representative profile of Paulding silty clay in a cultivated area in Liberty Township, 2½ miles west of Raymond, 2,300 feet east of intersection of County Roads 262 and 229.

Ap1—0 to 4 inches; dark gray (10YR 4/1) silty clay; moderate, fine and medium, granular structure; firm; many roots; very dark gray (10YR 3/1) organic coatings on granule surfaces; moderately acid; abrupt smooth boundary.

Ap2—4 to 7 inches; dark grayish brown (2.5Y 4/2) silty clay; strong fine angular blocky structure; very firm; common roots; neutral; clear smooth boundary.

B21g—7 to 14 inches; dark gray (N 4/0) clay; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; very firm; few roots; neutral; clear wavy boundary.

B22g—14 to 28 inches; dark gray (N 4/0) clay; many medium distinct strong brown (7.5YR 5/6) mottles; weak medium angular blocky structure; very firm; thin very patchy clay films on ped vertical surfaces; neutral; clear wavy boundary.

B23g—28 to 42 inches; dark gray (5Y 4/1) clay; many medium distinct yellowish brown (10YR 5/4, 5/6) mottles; massive in place parting to weak coarse angular blocky structure; very firm; few fine black (10YR 2/1) oxide stains; moderately alkaline; gradual wavy boundary.

B3g—42 to 52 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) silty clay; massive in place parting to weak medium prismatic structure; sticky and plastic when wet, extremely hard when dry; contains a few small limestone pebbles; moderately alkaline; diffuse irregular boundary.

C—52 to 62 inches; dark yellowish brown (10YR 4/4) silty clay; massive in place parting to weak coarse prismatic structure; sticky and plastic when wet, extremely hard when dry; common lime streaks and patches on prisms and in cracks; moderately alkaline and calcareous; contains a few small limestone pebbles.

Depth to calcareous material ranges from 40 to 55 inches. The Ap horizon is dark gray (10 YR 4/4) and dark grayish brown (2.5Y 4/2). The B2g horizon is dark gray (5Y 4/1 or N 4/0) and gray (N 5/0). Mottling in the B2g horizon is yellowish brown (10YR 5/6 and 5/8) and strong brown (1.5YR 5/6), and reaction ranges from neutral to moderately alkaline.

Paulding soils are near St. Clair and Nappanee soils. They commonly are in depressions and are darker colored than slightly higher lying, moderately well drained St. Clair soils and somewhat poorly drained Nappanee soils. They are more clayey than the Pewamo soils.

Pewamo Series

The Pewamo series consists of nearly level soils that are very poorly drained. These soils formed in calcareous glacial till of silty clay loam or clay loam texture, mostly in slight depressions in the uplands. They are in the eastern and northern parts of the county.

In a representative profile in a cultivated area, the plow layer is very dark gray silty clay loam 6 inches thick. The subsoil is 43 inches thick. In sequence from the top, it is 5 inches of very dark gray silty clay mottled with yellowish brown; 16 inches of dark gray silty clay mottled with yellowish brown and gray; and 22 inches of gray silty clay and silty clay loam mottled with yellowish brown. The substratum to a depth of 60 inches or more is gray silty clay loam mottled with yellowish brown.

These soils are well suited to crops commonly grown in the county. Corn, soybeans, small grain, and hay are the principal crops.

Representative profile of Pewamo silty clay loam in a cultivated area in Paris Township, 1 mile southeast of Marysville, 650 feet east of intersection of old U.S. Route 33 and the Penn-Central Railroad right-of-way:

Ap1—0 to 3 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Ap2—3 to 6 inches; very dark gray (10YR 3/1) silty clay loam; moderate, medium, angular blocky structure; firm; neutral; abrupt smooth boundary.

B21g—6 to 11 inches; very dark gray (10 YR 3/1) silty clay; common fine distinct yellowish brown (10YR 5/8) mottles; strong medium angular blocky structure; firm; slightly acid; clear wavy boundary.

IIB22tg—11 to 18 inches; dark gray (5Y 4/1) silty clay; common fine prominent yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; thin patchy clay films on vertical surfaces of peds; 2 percent glacial pebbles; neutral; clear wavy boundary.

IIB23tg—18 to 27 inches; dark gray (5Y 4/1) silty clay; many faint and medium prominent yellowish brown (10YR 5/6) mottles; massive but breaks to moderate coarse prismatic structure; very firm; thin continuous clay films on all ped surfaces; 2 percent glacial pebbles; neutral; clear wavy boundary.

IIB24tg—27 to 35 inches; gray (5Y 5/1) silty clay; many medium prominent yellowish brown (10YR 5/6) mottles; massive in place but breaks to weak coarse prismatic structure; very firm; thin continuous clay films on vertical surfaces of peds; 2 percent glacial pebbles; moderately alkaline; clear wavy boundary.

IIB3g—35 to 49 inches; gray (5Y 5/l) silty clay loam; many medium distinct, yellowish brown (10YR 5/6 and 5/8) mottles; massive; very firm; few fine distinct black (10YR 2/1) oxide stains; 2 percent glacial pebbles; moderately alkaline; gradual wavy boundary.

IIC—49 to 60 inches; gray (5Y 5/1) silty clay loam; many medium distinct, yellowish brown (10YR 5/6 and 5/8) mottles; massive; firm; 2 percent glacial pebbles; moderately alkaline and calcareous.

The dark-colored layer ranges from 10 to 16 inches in thickness. It is very dark gray (10YR 3/1), black (10YR 2/1), or very dark grayish brown (2.5Y 3/2). The B22, B23, and B24 horizons are dark gray (6Y 4/1), gray (6Y 5/1), or dark grayish brown (2.5Y 4/2). The B2 horizon ranges from slightly acid to moderately alkaline. In places these soils are covered with silty clay alluvium up to 14 inches thick.

Pewamo soils are the very poorly drained members of a drainage sequence that includes the moderately well drained Morley soils, the somewhat poorly drained Blount soils, and the poorly drained Wetzel soils. They have a thicker, dark colored surface layer than Wetzel soils and are less clayey. They are more clayey than Brookston soils.

Ross Series

The Ross series consists of nearly level soils that are well drained. These soils formed in stratified loamy alluvium. They are on the bottom land mainly along Big Darby Creek in the southern part of the county.

In a representative profile in a pasture, the surface layer is very dark gray silt loam 13 inches thick. The subsoil is 25 inches thick. In sequence from the top, it is 12 inches of black silt loam and 13 inches of black silty clay loam. The substratum to a depth of 60 inches is dark gray silty clay mottled with yellowish brown.

These soils are used mainly for pasture. Some areas are used for corn and soybeans.

Representative profile of Ross silt loam in a pasture area in Allen Township, 6 miles southwest of Marysville, 2,000 feet south of intersection of County Roads 146 and 75:

A11—0 to 13 inches; very dark gray (10YR 3/1) silt loam; very dark grayish brown (10YR 3/2) rubbed; strong medium granular structure; friable; moderately alkaline and calcareous; abrupt smooth boundary.
A12—13 to 25 inches; black (10YR 2/1) silt loam; very dark brown (10YR 2/2) rubbed; strong medium granular structure; friable; moderately alkaline and calcareous; abrupt smooth boundary.
IIA13—25 to 38 inches; black (10YR 2/1) silty clay loam; very dark brown (10YR 2/2) rubbed; strong fine angular blocky structure; firm; neutral; clear wavy boundary.
IIC—38 to 60 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; neutral.

The A1 horizon is very dark gray (10YR 3/1), black (10YR 2/1), and dark brown (10YR 3/3) and is 20 to 30 inches thick. The IIA1 horizon is 6 to 13 inches thick. The IIC horizon is black (10YR 2/1), very dark gray (10YR 3/1), and dark gray (10YR 4/1). In some profiles the lower part is grayish brown (10YR 5/2) and gray (5Y 5/1). The IIC horizon is silty clay and silty clay loam.

The Ross soils in this county have a slightly higher clay content to a depth of 40 inches than is typical for the series. This difference, however, does not greatly influence the use or behavior of these soils.

Ross soils are near Genesee and Eel soils. They are darker colored than either of those soils and are better drained than the Eel soils.

St. Clair Series

The St. Clair series consists of gently sloping to sloping soils that are moderately well drained. These soils formed in calcareous clayey glacial till that in places has been modified by water action in old glacial lakes. They are in the western part of the county.

In a representative profile in a cultivated area, the plow layer is grayish brown silt loam 5 inches thick. The subsoil is 23 inches thick. In sequence from the top, it is 3 inches of pale-brown silty clay loam; 8 inches of brown clay; 5 inches of brown clay mottled with yellowish brown; and 7 inches of yellowish brown silty clay mottled with grayish brown. The substratum to a depth of 60 inches or more is yellowish brown silty clay.

St. Clair soils are used mainly for pasture and crops. Corn, soybeans, small grain, and hay are the principal crops.

Representative profile of St. Clair silt loam, 2 to 6 percent slopes, in a cultivated area in Allen Township, 6 miles northwest of Marysville, 1 mile north of U.S. Route 33, 1,450 feet east of intersection of County Roads 149 and 137:

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam; moderate medium granular structure; friable; common roots; very strongly acid; abrupt smooth boundary.
B1—5 to 8 inches; pale-brown (10YR 6/3) silty clay loam; moderate medium subangular blocky structure; firm; some stickiness when wet; common roots; a few glacial pebbles as much as 1 inch in diameter; very strongly acid; clear wavy boundary.
B21t—8 to 16 inches; brown (10YR 4/3) clay; moderate, medium and coarse, subangular blocky structure; firm; sticky and plastic when wet, common roots; medium continuous clay films; a few glacial pebbles as much as 1 inch in diameter; very strongly acid; clear wavy boundary.
B22t—16 to 21 inches; brown (10YR 4/3) clay; few fine faint yellowish brown (10YR 5/4) mottles; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; sticky when wet; medium continuous clay films; a few glacial pebbles as much as 1 inch in diameter; moderately alkaline; clear wavy boundary.
B3t—21 to 28 inches; yellowish brown (10YR 5/4) silty clay; few fine faint

grayish brown (10YR 5/2) mottles; moderate coarse prismatic structure parting to weak coarse subangular blocky; firm sticky and plastic when wet; thin and medium continuous grayish brown (10YR 5/2) clay films; a few glacial pebbles as much as 1 inch in diameter; moderately alkaline and calcareous; clear wavy boundary.

C1—28 to 40 inches; yellowish brown (10YR 5/4) silty clay; moderate coarse prismatic structure; firm sticky and plastic when wet; some thin very patchy gray (10YR 5/1) clay coatings; 1 percent coarse fragments; moderately alkaline and calcareous; clear wavy boundary.

C2—40 to 60 inches, yellowish brown (10YR 5/4) silty clay; moderate coarse prismatic structure; firm; sticky and plastic when wet; gray (10YR 5/1) clay coatings; 1 percent coarse fragments; moderately alkaline and calcareous.

Depth to carbonates ranges from 16 to 28 inches. The Ap horizon is grayish brown (10YR 5/2), and dark grayish brown (10YR 4/2). The A1 horizon in wooded areas is very dark gray (10YR 3/1) and is 1 to 3 inches thick. The A2 horizon in wooded areas is 3 to 5 inches thick. The B1 horizon is silty clay loam and silty clay 1 to 3 inches thick. The B2 horizon is yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/4), and dark brown (10YR 4/3) clay or silty clay that is 50 to 60 percent clay. The B horizon is very strongly acid to slightly acid in the upper part and grades to moderately alkaline and calcareous in the lower part.

St. Clair soils are the moderately well drained members of a drainage sequence that includes the somewhat poorly drained Nappanee soils and the very poorly drained Paulding soils. Their B and C horizons are more clayey than those of Morley or Miamian soils.

Shoals Series

The Shoals series consists of nearly level soils that are somewhat poorly drained. These soils formed in loamy alluvium along the major streams in the county.

In a representative profile in a cultivated area, the plow layer is dark grayish brown silt loam 9 inches thick. The subsoil is 29 inches thick. In sequence from the top, it is 5 inches of dark grayish brown silt loam mottled with light olive brown and 24 inches of dark grayish brown silty clay loam mottled with light olive brown. The substratum to a depth of 60 inches or more is grayish brown silty clay mottled with light olive brown.

These soils are used for pasture and cultivated crops. The main crops are corn and soybeans.

Representative profile of Shoals silt loam in a cultivated field in Paris Township, north of Marysville; 1 mile north of intersection of County Road 114 and Penn-Central Railroad right-of-way:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; very dark grayish brown (10YR 3/2) organic coatings on granule faces; slightly acid; abrupt smooth boundary.

B1g—9 to 14 inches; dark grayish brown (2.5Y 4/2) silt loam; few fine distinct light olive brown (2.5Y 5/4) mottles; moderate medium angular blocky structure; friable; very dark grayish brown (2.5Y 3/2) organic coatings on ped faces; slightly acid; clear smooth boundary.

B21g—14 to 26 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4) mottles; weak medium angular blocky structure; firm; neutral; gradual wavy boundary.

B22g—26 to 38 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4 and 5/6) mottles; weak coarse angular blocky structure; firm; few fine distinct dark brown (7.5YR 3/2) oxide concretions; neutral; gradual wavy boundary.

Cg—38 to 60 inches; grayish brown (2.5Y 5/2) silty clay; common fine distinct light olive brown (2.5Y 5/6) mottles; weak coarse angular blocky structure; firm; moderately alkaline and calcareous.

The B2g horizon is dark grayish brown (2.5Y 4/2), grayish brown (2.5Y 5/2), and gray (5Y 5/1). The B horizon ranges from slightly acid to neutral and is silty clay loam and silt loam. Some profiles have a thin horizon of silty clay in the lower part.

Shoals soil are somewhat poorly drained members of a drainage sequence that includes the well drained Genesee soils, the moderately well drained Eel soils, and the darker colored, very poorly drained Sloan soils. They are grayer and more mottled than the Eel and Genessee soils. They differ from Algiers soils in that the Algiers soils are underlain by a very poorly drained, darker colored soil.

Sleeth Series

The Sleeth series consists of nearly level soils that are somewhat poorly drained. These soils formed in loamy outwash material underlain by sandy and gravelly material at a depth of 42 to 60 inches. They are on outwash terraces along the major streams north of Big Darby Creek.

In a representative profile in a cultivated area, the plow layer is dark grayish brown silt loam 11 inches thick. The subsoil is 43 inches thick. In a sequence from the top, it is 4 inches of grayish brown silt loam mottled with brown and yellowish brown; 7 inches of brown silty clay loam mottled with yellowish brown, grayish brown, and gray; 16 inches of yellowish brown silty clay loam mottled with gray and yellowish brown; 10 inches of brown silty clay loam mottled with gray, yellowish brown, and dark yellowish brown; and 6 inches of yellowish brown silty clay mottled with grayish brown and light olive brown. The substratum to a depth of 65 inches or more is olive yellow very gravelly sand mottled with light brownish gray.

Sleeth soils are used mainly for corn, soybeans, small grain, and hay.

Representative profile of Sleeth silt loam, 0 to 2 percent slopes, in a cultivated area in Taylor Township, 6-1/2 miles northwest of Marysville, 1,730 feet south of County Road 205, 2,890 feet east of intersection of County Roads 191 and 205:

Ap— 0 to 11 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary

B1—11 to 15 inches; grayish brown (10YR 5/2) silt loam; common medium distinct brown (10YR 5/3) and yellowish brown (10YR 6/6) mottles; weak fine subangular blocky structure; friable; 2 percent gravel; neutral; clear wavy boundary.

B21tg—15 to 22 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6), grayish brown (10YR 5/2), and gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; slightly sticky and plastic when wet; thin continuous gray (10YR 6/1) clay films; 3 percent gravel; neutral; clear wavy boundary.

IIB22tg—22 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct gray (10YR 6/1) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; slightly sticky and plastic when wet; thin continuous gray (10YR 6/1) clay films; common medium distinct very dark brown (10YR 2/2) oxide stains; 5 percent gravel; very strongly acid; clear wavy boundary.

IIB23t—38 to 48 inches; brown (10YR 5/3) silty clay loam; common medium distinct gray (10YR 6/1), yellowish brown (10YR 5/6), and dark yellowish brown (10YR 44) mottles; moderate medium subangular blocky structure; firm; slightly sticky and plastic when wet; thin continuous gray (10YR 6/1) clay films; common medium distinct very dark brown (10YR 2/2) oxide stains; 5 percent gravel; slightly acid; clear wavy boundary.

IIB3t—48 to 54 inches; yellowish brown (10YR 5/6) silty clay; common medium distinct grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; firm; slightly sticky and plastic when wet; some gray (10YR 6/1) and light-gray (10YR 7/1) clay flows; 10 percent gravel; moderately alkaline; clear wavy boundary.

IIIC—54 to 65 inches, olive yellow (2.5Y 6/6) very gravelly sand; common medium distinct light brownish gray (10YR 6/2) mottles; single grained; loose; moderately alkaline and calcareous.

The Ap horizon is dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2). The B2 horizon is silty clay loam, clay loam, and sandy clay loam, 15 to 20 percent of the sand content is coarser than very fine sand.

The B2 horizon ranges from neutral to very strongly acid. Depth to the very gravelly sand C horizon ranges from 42 to 60 inches.

Sleeth soils are the somewhat poorly drained members of a drainage sequence that includes the darker colored, very poorly drained Westland soils. They are deeper over the stratified sand and gravel C horizon than Homer soils.

Sloan Series

The Sloan series consists of nearly level soils that are very poorly drained. These soils formed in recent loamy alluvium washed from soils that are mostly underlain by calcareous glacial till. They are on the flood plains along most of the streams in the county.

In a representative profile in a cultivated area, the plow layer is very dark gray silty clay loam 10 inches thick. The lower part of the surface layer is 7 inches thick and is very dark gray silty clay loam mottled with yellowish brown. The subsoil is 8 inches thick and is dark gray silty clay loam mottled with dark brown. The substratum to a depth of 60 inches or more is dark gray silty clay loam mottled with brown and strong brown and gray silty clay loam mottled with brown.

Sloan soils have a seasonal high water table. The gray colors and the mottling in the subsoil indicate natural wetness. Permeability is moderately slow. The root zone is deep if the soil is adequately drained, has high available water capacity, and is commonly neutral in the upper part grading to moderately alkaline in the lower part.

Sloan soils are used for pasture and crops. Corn and soybeans are the principal crops.

Representative profile of Sloan silty clay loam, in a cultivated area in Mill Creek Township, three-fourths mile northwest of Watkins, one-third mile west of intersection of County Roads 94 and 100:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine granular structure; friable; very dark grayish brown (10YR 3/2) rubbed; neutral; abrupt smooth boundary.

A1—10 to 17 inches; very dark gray (10YR 3/1) silty clay loam; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium granular structure; friable; very dark grayish brown (10YR 3/2) rubbed; neutral; clear smooth boundary.

B2g—17 to 25 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct dark brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; firm; neutral; gradual smooth boundary.

C1—25 to 40 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct brown (7.5YR 5/4) and strong brown (7.5YR 5/6) mottles; massive; firm; moderately alkaline; gradual smooth boundary.

C2—40 to 60 inches; gray (10YR 5/1) silty clay loam; common medium distinct brown (7.5YR 5/4) mottles; massive; firm; moderately alkaline.

The Ap and A1 horizons are very dark gray (10YR 3/1), very dark brown (10YR 2/2), and black (10YR 2/1 and N 2/0). The A horizon ranges from 11 to 24 inches in thickness. The Bg horizon is dark gray (10YR 4/1), gray (10YR 5/1), and grayish brown (10YR 5/2). The content of clay in the Bg and C1 horizons is less than 35 percent. Reaction is neutral to moderately alkaline.

Sloan soils are the very poorly drained members of a drainage sequence that includes the well drained Genesee soils, the moderately well drained Eel soils, and the somewhat poorly drained Shoals soils. They are darker colored than Algiers soils and are not so well drained.

Warsaw Series

The Warsaw series consists of nearly level to gently sloping, dark colored soils that are well drained. These soils formed in loamy material 30 to 40 inches thick over stratified sand and gravel. They are on glacial outwash terraces of Wisconsin age, mainly along Big Darby Creek.

In a representative profile in a cultivated area, the upper 9 inches of the surface layer, or the plow layer, is very dark grayish brown silt loam. The lower 6 inches is very dark brown silt loam. The subsoil is 23 inches thick. In sequence from the top, it is 6 inches of dark brown silty clay loam; 5 inches of dark brown clay loam; 7 inches of dark brown sandy clay loam; and 5 inches of very dark brown gravelly sandy loam. The substratum to a depth of 60 inches or more is dark grayish brown and grayish brown, stratified sand and gravel.

Warsaw soils are moderately permeable to a depth of 30 to 40 inches and rapidly permeable in the sandy and gravelly material below. They warm up early in spring. The sandy and gravelly material restricts roots. The root zone is moderately deep and has medium available water capacity. Consequently, the soils tend to be droughty, especially for crops that mature late in summer. The upper part of the root zone commonly ranges from strongly acid to moderately alkaline. The lower part and the underlying sandy and gravelly material are calcareous.

Warsaw soils are used mainly for corn, soybeans, small grain, and hay.

Representative profile of Warsaw silt loam, 1 to 4 percent slopes in a cultivated area in Union Township, 1 mile northwest of Milford Center, 1,325 feet northeast of the intersection of County Roads 57 and 76:

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

A1—9 to 15 inches; very dark brown (10YR 2/2) silt loam; very dark grayish brown (10YR 3/2) rubbed; weak medium granular structure; friable; common roots; moderately acid; clear wavy boundary.

B1—15 to 21 inches; dark brown (7.5YR 3/2) silty clay loam; dark brown (7.5YR 4/2) rubbed; moderate fine subangular blocky structure; friable; common roots; 10 percent gravel; strongly acid; clear wavy boundary.

IIB21t—21 to 26 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/2) clay films on vertical and some horizontal ped faces; 10 percent gravel; strongly acid; clear wavy boundary.

IIB22t—26 to 31 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate, medium and coarse, subangular blocky structure; firm; medium continuous dark brown (7.5YR 4/2) clay films on all ped surfaces; 15 percent gravel; strongly acid; gradual wavy boundary.

IIB23t—31 to 33 inches; dark brown (7.5YR 4/4) sandy clay loam; weak, medium and coarse, subangular blocky structure; firm; medium continuous very dark brown (10YR 2/2) organic clay coatings on all ped surfaces; 15 percent gravel; moderately acid; abrupt irregular boundary.

IIB3—33 to 38 inches; very dark brown (10YR 2/2) gravelly sandy loam, dark brown (10YR 3/3) rubbed; weak coarse subangular blocky structure; friable; 20 percent gravel; moderately alkaline and calcareous; diffuse irregular boundary.

IIC—38 to 60 inches; dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) stratified sand and gravel; loose; moderately alkaline and calcareous.

Thickness of the loamy material overlying stratified calcareous sand and gravel ranges from 30 to 40 inches. The Ap and A1 horizons are very dark grayish brown (10YR 3/2) and very dark brown (10YR 2/2). The A horizon ranges from 11 to 15 inches in thickness. The IIB2 horizon is sandy clay loam, clay loam, and silty clay loam. The weighted average clay content of the Bt horizon is less than 35 percent. The B2 horizon ranges from strongly acid to slightly acid in the upper part to slightly acid or neutral in the lower part. The B3 horizon has clay films on the surface of gravel and sand grains in some places.

Warsaw soils are the well-drained members of a drainage sequence that includes the somewhat poorly drained Kane soils and the very poorly drained, dark-colored Lippincott soils. They are commonly near the lighter colored Fox soils.

Westland Series

The Westland series consists of soils that are very poorly drained. These soils formed in loamy material more than 42 inches thick over stratified sand and gravel. They are nearly level or in slight depressions on low outwash terraces along the major streams in the county north of Big Darby Creek.

In a representative profile in a cultivated area, the plow layer and lower part of the surface layer is black silty clay loam 14 inches thick. The subsoil is 43 inches thick. It is 5 inches of dark gray silty clay mottled with yellowish brown; 14 inches of grayish brown clay loam mottled with yellowish brown; 12 inches of yellowish brown and olive gravelly loam. The substratum to a depth of 65 inches or more is stratified sand and gravel.

Westland soils are used mainly for corn and soybeans.

Representative profile of Westland silty clay loam in a cultivated area in Darby Township, 3¼ miles south of Marysville, 2,000 feet southwest of the intersection of State Route 38 and County Road 62:

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

A1—8 to 14 inches, black (N 2/0) silty clay loam, black (10YR 2/1) rubbed; strong fine subangular blocky structure; firm; common roots; neutral; clear smooth boundary.

B21tg—14 to 19 inches; dark gray (10YR 4/1) silty clay; common fine distinct yellowish brown (10YR 5/4, 5/6) mottles; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; firm; few thin patchy very dark grayish brown (10YR 3/2) clay films on vertical ped surfaces; common roots; neutral; clear wavy boundary.

B22tg—19 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; few roots; thin continuous dark grayish brown (2.5Y 4/2) clay films on vertical and most horizontal ped surfaces; neutral; gradual wavy boundary.

B23tg—25 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6, 5/8) mottles; weak medium prismatic structure; firm; few thin continuous dark grayish brown (2.5Y 4/2) clay films on vertical ped surfaces; few, fine and medium, very dark brown (10YR 2/2) oxide stains; 5 percent igneous and dolomitic pebbles; moderately alkaline; gradual wavy boundary.

IIB31—33 to 45 inches; olive-gray (5Y 5/2) and yellowish brown (10YR 5/8) loam; massive; friable; 10 percent coarse fragments consisting of shale and partly weathered dolomitic pebbles; moderately alkaline and calcareous; diffuse irregular boundary.

IIB32— 45 to 57 inches; yellowish brown (10YR 5/8) and olive (5Y 5/4) gravelly loam; massive; friable; 25 percent coarse fragments consisting of dolomitic cobblestones; moderately alkaline and calcareous; diffuse irregular boundary.

IIIC—57 to 65 inches; brown (10YR 5/3) stratified sand and gravel; loose; moderately alkaline and calcareous.

The depth to sand and gravel is 42 to 60 inches. Depth to carbonates ranges from 32 to 50 inches. The A1 horizon is black (N 2/0) and very dark gray (10YR 3/1). The A horizon ranges from 12 to 16 inches in thickness. The B2 horizon is dark gray (10YR 4/1), grayish brown (2.5Y 5/2), and gray (5Y 5/1), and is silty clay loam, clay loam, and silty clay. The B2 horizon ranges from slightly acid in the upper part to moderately alkaline in the lower part. The B3 horizon is 10 to 30 percent coarse fragments consisting mostly of shale and dolomitic pebbles. In some places the coarse fragments have clay coatings.

The Westland soils in this county have a slightly higher clay content in the upper part of the B horizon than is defined as the range for the series. This difference does not greatly influence the use or behavior of these soils.

Westland soils are the very poorly drained members of a drainage sequence that includes the lighter colored, somewhat poorly drained Sleeth soils. In contrast with Lippincott soils, they have a lower content of clay in the B horizon and are deeper over the stratified sand and gravel C horizon.

Wetzel Series

The Wetzel series consists of soils that are poorly drained. These soils formed in silty clay loam or clay loam glacial till. In many places they formed in areas that were shallow glacial lakes where a thin deposit of smooth, clayey lacustrine material covers the glacial till. They are in nearly level areas and in depressions in uplands in the northern and eastern parts of the county.

In a representative profile in a cultivated area, the plow layer is dark grayish brown silty clay loam 9 inches thick. The subsoil is 38 inches thick. In sequence from the top, it is 16 inches of dark gray silty clay mottled with dark brown, strong brown, dark yellowish brown, and yellowish brown; 7 inches of gray silty clay mottled with dark yellowish brown and yellowish brown; and 15 inches of gray silty clay loam mottled with dark yellowish brown and yellowish brown. The substratum to a depth of 60 inches or more is dark yellowish brown and gray silty clay loam.

Wetzel soils are used mainly for corn, soybeans, small grain, and hay.

Representative profile of Wetzel silty clay loam, in a cultivated area in Leesburg Township, 6 miles northeast of Marysville, 1,475 feet west and 80 feet south of intersection of County Road 176 and State Route 4:

Ap1—0 to 7 inches; dark grayish brown (2.5Y 4/2) silty clay loam; weak medium subangular blocky structure; firm; many roots; neutral; abrupt smooth boundary.

Ap2—7 to 9 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; strong, fine and medium, angular blocky structure; firm; common roots; slightly acid; clear smooth boundary.

B1g—9 to 17 inches; dark gray (N 4/0) silty clay; common fine distinct and prominent dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm; common fine roots particularly along vertical ped faces; neutral; clear smooth boundary.

B21tg—17 to 25 inches; dark gray (N 4/0) silty clay; common fine distinct and prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4, 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; thin patchy very dark gray (N 3/0) clay films on ped faces; 2 percent pebbles; neutral; clear smooth boundary.

B22tg—25 to 32 inches; gray (N 5/0) silty clay; common fine distinct and prominent dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4, 5/6) mottles; weak medium prismatic structure; firm; thin continuous dark gray (N 4/0) clay films on ped faces and in old root channels; few fine black (10YR 2/1) concretions; 2 percent pebbles; neutral; gradual wavy boundary.

B3—32 to 47 inches; gray (10YR 5/1) silty clay loam; many medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4, 5/6) mottles; weak coarse prismatic structure; firm; thin patchy clay films on vertical ped faces; few fine black (10YR 2/1) concretions; 2 to 5 percent pebbles; moderately alkaline; gradual wavy boundary.

C—47 to 60 inches; dark yellowish brown (10YR 4/4) and gray (10YR 5/1) silty clay loam; massive; firm; 10 percent pebbles; few cobblestones; moderately alkaline and calcareous.

Thickness of the solum and depth to carbonates ranges from 36 to 52 inches. The Ap horizon is dark grayish brown (2.5Y 4/2 or 10YR 4/2) and dark gray (10YR 4/1). The B2 horizon is dark gray (N 4/0), gray (N 5/0), and grayish brown (2.5Y 5/2). The B horizon is neutral in the upper part and moderately alkaline in the lower part.

Wetzel soils are the poorly drained members of a drainage sequence that includes the moderately well drained Morley soils, the somewhat poorly drained Blount soils, and the very poorly drained Pewamo soils. Their A horizon is lighter colored than that of the Pewamo soils.

Formation of the Soils

This section describes the major factors of soil formation, tells how these factors have affected the soils in Union County, and explains some of these processes in soil formation. The soil series in this county and a profile representative of each series are described in the section "Classification of the Soils."

Factors of Soil Formation

Soils are the product of soil-forming processes acting on material deposited or accumulated by geologic forces. The major factors in soil formation are parent material, climate, relief, living organisms, and time.

Climate and living organisms, particularly vegetation, are the active forces in soil formation. Their effect on the parent material is modified by relief and by the length of time the parent material has been acted upon. The relative importance of each factor differs from place to place. In some places one factor dominates and determines most of the soil properties, but normally the interaction of all five factors determines what kind of soil forms in any given place.

Parent material

The soils of Union County formed in several kinds of parent material: glacial till, outwash material, and loess, or combinations of lacustrine deposits, recent alluvium, and accumulated organic material.

Glacial till, a general term applied to extensive glacial deposits, is the most extensive of the parent materials in the county. The upland soils formed in glacial till; however, as much as 14 inches of loess capping overlies some of the till areas. In these areas the upper part of the soil formed in loess. Blount, Morley, Celina, and Crosby are the principal soils that are partially capped by loess. The till is fairly homogeneous and uniform in texture, and the soils formed in this parent material have a moderately fine to fine textured subsoil.

Outwash sand and gravel was deposited in the county by melt water along the glacial streams in the county. Much of this fairly well sorted coarse material was covered by finer textured loamy outwash. Fox and Westland soils, for example, formed in these materials. Fox soils are reddish brown because drainage is good. Westland soils are dominantly gray because the water table is high and aeration is poor.

Areas of lacustrine material (lake bottom sediment) are not extensive in the county. The interlayered silty and clayey characteristics of the parent material in these areas are reflected in the fine-textured, plastic subsoil of the Henshaw and Montgomery soils.

Alluvial, or flood water, deposits are the youngest parent materials in the county. These materials are still accumulating as fresh sediment is added by the overflow of streams. The sediment is from the surface layer of the higher lying soils in the county and from exposures of glacial till. Genesee soils, which are deep, fertile, and neutral in reaction, formed in alluvial material.

Accumulated organic material occurs in a few scattered areas in the southwestern part of the county. It consists mainly of decomposed remains of trees, sedges, and grasses that have accumulated in potholes and in drainageways where the water table is high and where seepage water has kept the area permanently wet. This material is slightly acid to neutral in reaction. Muskego soils formed in this material.

Climate

The climate throughout Union County is uniform enough that it has not greatly contributed to differences among the soils. It has been favorable to both physical change and chemical weathering of parent materials and to biological activity.

Rainfall has been adequate for percolating water to leach carbonates to a moderate depth, as in the Morley, Celina, and Blount soils. For example, frequency of rainfall caused wetting and drying cycles favorable to the translocation of clay minerals and formation of soil structure, as in Morley, Miamian, and Fox soils.

The range of temperature variations has favored both physical change and chemical weathering of parent material. Freezing and thawing aided the formation of soil structure, and warm temperatures in summer favored chemical reactions in the weathering of primary minerals.

Rainfall and temperature have been conducive to plant growth and the accumulation of organic matter in all the soils.

Relief

Relief can account for the formation of different soils from the same kind of parent materials. Morley, Blount, and Pewamo soils all formed in glacial till. The moderately well drained Morley soils have a moderately thick solum. They generally formed where the slope was not steep enough to encourage excessive erosion nor so nearly level to prevent runoff. The somewhat poorly drained Blount soils are nearly level and formed in areas where runoff is slow. Nearby, the very poorly drained, dark - colored Pewamo soils formed in the swales where organic residues accumulate because the water table is high most of the year. Blount soils and the steep Morley soils are dominant in the morainic areas. The nearly level to gently undulating Blount, Wetzel, and Pewamo soils are dominant on the till plains.

Living organisms

At the time Union County was settled, the vegetation was predominantly hardwood forest, dominantly beech, maple, oak, hickory, and ash. Grassy clearings occurred on the well-drained sites and marshy openings in the poorly drained swales.

Soils that formed in forested areas are acid and moderate in natural fertility. They include the Morley, Blount, and St. Clair soils. In the well-drained grassy clearings are the dark-colored, less acid, and more fertile Odell and Kane soils. In the marshy swales are the very poorly drained, dark-colored, fertile soils, such as Pewamo and Brookston soils and the poorly drained Wetzel soils.

Small animals, insects, worms, and roots make the soil more permeable by channeling in it. Animals also mix the soil materials in their life activities and contribute organic matter in the process and after death. Worm channels or casts are plentiful in the highly organic surface layer of Odell and Kane soils. Crayfish channels are prevalent in the more poorly drained Paulding, Wetzel, and Montgomery soils.

The activities of man also affect the course of soil formation. Man plows and plants and introduces vegetative changes. He drains some areas, irrigates some, and removes soil material from others for construction purposes. His use of lime and fertilizer changes the chemistry of the soils. Each of these activities, in its own way, affects the future formation of the soil.

Time

Time is needed for the other soil-forming factors to produce their effects. The age of a soil is indicated, to some extent, by the degree of profile formation. In many places, factors other than time have been responsible for most of the differences in kind and distinctness of horizons in the different soils. If the parent material weathers slowly, the profile forms slowly. If slopes are steep and soil is removed almost as fast as it forms, no distinct horizons form.

Most soils in the county have a well-formed profile. Examples are the Morley, Blount, Fox, Celina, and Crosby soils. On the flood plains, frequent deposits of fresh sediment periodically interrupt the soil-forming process. The Genesse and Eel on flood plains are examples of soils in which horizons are not well formed or expressed.

Processes of Soil Formation

All the factors of soil formation act in unison to control the processes by which horizons form. These processes are (1) additions, (2) removals, (3) transfers, and (4) transformations. Some promote horizon differentiation, but others retard or obliterate differences that are already present.

In most upland areas of Union County, these soil forming processes have significantly changed the original material to produce the soils we see today. The changes are much less pronounced in the alluvial soils.

In this region the most evident addition to the soil is organic matter. Soils that formed under deep-rooted grasses, or where a high water table has restricted decomposition of organic matter have a deep, dark-colored surface horizon. The surface horizon is high in organic matter, has good structure, and has a high cation exchange capacity. Examples of such soils are Pewamo or Brookston soils. The lighter colored soils in Union County have also experienced additions of organic matter, but to a lesser extent. The surface layer of soils like Blount and Miamian contain only 1 to 3 percent organic matter, but this is considerably more than was in the parent material of these soils. These accumulations of organic matter, although small, contribute significantly to the cation exchange capacity and available water capacity of the soils. Severe erosion can remove all evidence of this addition to the soil profile.

Leaching of carbonate from calcareous parent material is one of the most significant losses that precedes many other chemical changes in the solum. Most of the glacial till in Union County has a high content of carbonate (25 to 45 percent). In most soils carbonates have been leached to a depth of 2 feet or more, and the upper 2 feet is now acid. Other minerals in the soil are subjected to the same chemical weathering, but their resistance is higher and removal is slower. Following the removal of carbonates, alteration of such minerals as biotite and feldspar results in changes of color within the profile. Free iron oxides are produced that may be segregated by a fluctuating high water table to produce gray colors and mottling, as in Brookston soils, for example. Unless the water table is seasonally high within the profile, brownish colors that have stronger chroma or redder hue than those in the C horizon are typical.

Seasonal wetting and drying of the soil profile is largely responsible for the transfer of clay from the A horizon to the ped surfaces in the B horizon. The fine clays become suspended in percolating water moving through the A horizon. They are carried by the water to the B horizon. There, the fine clays are deposited on the ped surfaces by drying or by precipitation caused by free carbonates. This transfer of fine clay accounts for the patchy or nearly continuous clay films on ped surfaces in the B horizon of such soils as the Morley, Miamian, and Celina soils.

Transformations of mineral compounds occur in most soils. The results are most apparent if the formation of horizons is not affected by rapid erosion or by accumulation of material at the surface. The primary silicate minerals are weathered chemically to produce secondary minerals, mainly those of the layer-lattice silicate clays. Most of the layer-lattice clays remain in the soil profile, but clay from the A horizon is transferred to deeper horizons.

References

1) Allan, Phillip F., Garland, Lloyd D., and Dugan, R. Franklin. 1963. Rating Northeastern Soils for Their Suitability for Wildlife Habitat. N. Amer. Wildlife and Nat. Res. Conf., pp. 247-261, illus.

2) American Association of State Highway and Transportation Officials. 1961. Standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 vols., illus.

3) American Society for Testing and Materials. 1967. Tentative method for classification of soils for engineering purposes. ASTM D2487-66T. In Book of ASTM Standards, pt. 2, pp. 766-771

4) Barrows, H.L., and Simpson, E.C. An EDTA Method for the Direct Determination of Calcium and Magnesium in Soils and Plant Tissue. Soil Sci. Soc. Amer. Proc. 26, pp. 443-445.

5) Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

6) Environmental Laboratory, U.S. Army Corps of Engineers. 1987. Corps of Engineers wetlands delineation manual. Technical Report Y-87-1, U.S. Army Engineers Waterways Experiment Station, Vicksburg, Mississippi.

7) Federal Register. July 13, 1994. Changes in hydric soils of the United States.

8) Federal Register. February 24, 1995. Hydric soils of the United States.

9) National Research Council. 1995. Wetlands: Characteristics and boundaries. National Academy Press, Washington, DC.

10) Peech, Michael, Alexander, L.T., Dean, L.A., and Reed, J. Fielding. 1947. Methods of Soil Analysis for Soil-Fertility Investigations. U.S. Dept. Agr. Circular 757, 25 pp.

11) Piper, C.S. 1947. Soil and Plant Analysis. Interscience Publishers Inc., New York.

12) Schnur, G. Luther. 1937. Yield, Stand, and Volume Tables for Even-Aged Upland Oak Forests. U.S. Dept. Agr. Tech. Bul. 560, 88 pp., illus (Reprinted in 1961).

13) 1970. Soil Taxonomy of the National Cooperative Soil Survey. U.S. Dept. Agr., Soil Conserv. Serv., December.

14) Simonson, Roy W. 1962. Soil Classification in the United States. Sci. 137: 1027-1034, illus.

15) Steele, J. G. and Bradfield, Richard. 1934. The Significance of Size Distribution in the Clay Fraction. The Amer. Soil Survey Assoc. Bul. 15, pp. 88-93.

16) Stout, Wilbur, Ver Steeg, Karl, and Lamb, G.F. 1943. Geology of Water in Ohio. Geol. Survey of Ohio, fourth series, Bul. 44, 694 pp., illus.

17) Tiner, R.W., Jr. 1985. Wetlands of Delaware. Cooperative Publication, U.S. Fish and Wildlife Service, Newton Corner, Massachusetts, and Delaware Department of Natural Resources and Environmental Control, Wetlands Section, Dover, Delaware.

18) United States Department of Agriculture, Soil Conservation Service. 1961. Land

capability classification. I.S. Dep. Agric. Handb. 210, 21 pp., illus.

19) United States Department of Agriculture. 1951. Soil Survey Manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

20) 1960. Soil Classification, A Comprehensive System, 7th Approximation. 265 pp., illus. (Supplements issued in March 1967 and September 1968)

21) United States Department of Defense. 1968. Unified Soil Classification System for Roads, Airfields, Embankments and Foundations. MILSTD-619B, 30 pp., illus.

22) United States Department of Agriculture, Soil Conservation Service. 1975. Soil Taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Survey Staff, United States Department of Agriculture Handbook 436

23) United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. Soil Survey Staff, United States Department of Agriculture Handbook 18.

24) United States Department of Agriculture, Soil Conservation Service. 1994. Keys to soil taxonomy. Sixth edition. Soil Survey Staff.

25) United States Department of Agriculture, Natural Resources Conservation Service. 1996. Field indicators of hydric soils in the United States. G.W. Hurt, P.M. Whited, and R.F. Pringle, eds.

26) Westgate, Lewis G. 1926. Geology of Delaware County. Geol. Survey of Ohio, fourth series, Bul. 30, 147 pp., illus.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Anaerobic. (i) The absence of molecular oxygen. (ii) Growing in the absence of molecular oxygen (such as anaerobic bacteria). (iii) Occurring in the absence of molecular oxygen (as a biochemical process).

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of alluvial clay.

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 water 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

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, 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.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, 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.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

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.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

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.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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. Any tillage and planting system in which a cover of crop residue is maintained on at least 30 percent of the soil surface after planting in order to reduce the hazard of water erosion; in areas where soil blowing is the primary concern, a system that maintains a cover of at least 1,000 pounds of flat residue of small grain or the equivalent during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.--Noncoherent when dry or moist; does not hold together in a mass.

Friable.--When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.--When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.--Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.--Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.--When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.--When dry, breaks into powder or individual grains under very slight pressure.

Cemented.--Hard; little affected by moistening.

Contour stripcropping (or contour farming). 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.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deep soil. A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.--These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Well drained.--These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.--These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.--These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.--These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.--These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

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.

End moraine. Belt of sharply rolling or hummocky land composed of till deposited along the roughly continuous edge of a glacier. An end moraine marks the position of the ice during a halt or minor readvance.

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.

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, for example, 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.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

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 inundation under flood-stage conditions unless protected artificially. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foot slope. The geomorphic component that forms the inner, gently inclined surface at the base of a hill slope. The surface profile is dominantly concave. In terms of gradational processes, a foot slope is a transition zone between an upslope site of erosion (back slope) and a downslope site of deposition (toe slope).

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.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

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 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground moraine (geology). Glacial till accumulated beneath the advancing ice and deposited from it during its dissolution rather than aggregated in a thickened belt at the ice edge, the deposit is relatively thin and characteristically forms an undulating plain with gently sloping swells, sags, and closed depressions.

Ground water. (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. A gullied map unit is one that has numerous gullies.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

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.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

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. 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.

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.

E horizon.--The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some 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, the number 2 precedes the letter C.

Cr horizon.--Sedimentary beds of consolidated sandstone and semiconsolidated and consolidated shale. Generally, roots can penetrate this horizon only along fracture planes.

R layer.--Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but 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-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Hydrophytic vegetation. The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	Very low
0.2 to 0.4	Low
0.4 to 0.75	Moderately low
0.75 to 1.25	Moderate
1.25 to 1.75	Moderately high
1.75 to 2.5	High
More than 2.5	Very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

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.

Kame. A mound-like hill of glacial drift, composed chiefly of stratified sand and gravel.

Kame terrace. A terrace-like ridge consisting of stratified sand and gravel that were deposited by a meltwater stream flowing between a melting glacier and a higher valley wall or lateral moraine and that remained after the disappearance of the ice. It is commonly pitted with kettles and has an irregular ice-contact slope.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Krotovinas. Irregular tubular streaks within one layer of material transported from another layer. Caused by the filling of tunnels made by burrowing animals in one layer with material from outside the layer and appear as rounded or elliptical volumes of various sizes. They may have light color in dark layers or dark color in light layers, and their qualities of texture and structure may be unlike that of the soil around them.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well sorted, stratified sediments.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

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-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

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 deep soil. A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of glacial drift in a topographic landform of its own, resulting chiefly from the direct action of glacial ice. Some types are lateral, recessional, and terminal.

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. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance--*few, common,* and *many*; size--*fine, medium,* and *coarse*; and contrast--*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables--hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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 plain. An extensive area of glaciofluvial material that was deposited by meltwater streams.

Oxbow. The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

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 downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow...............Less than 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 inch
Moderately rapid....2.0 to 6.0 inches
Rapid ....6.0 to 20 inches
Very rapid ....More than 20 inch

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

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. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, 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.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity. expressed as pH values, are:

Extremely acid..............Below 4.5

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

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

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.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits.

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.

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.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. 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.

Shallow soil. A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. 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.

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 or dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

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.

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.

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 underlying material. 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 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Composed of, or arranged in, strata, or layers, such as stratified alluvium. The term is confined to geological material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

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 soil blowing 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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter or loosen a layer that is restrictive to roots.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

Surface layer (surface soil). 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."

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.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

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 is generally 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 too thin for the specified use.

Till plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by or consists of till and that has a slope of 0 to 8 percent.

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. Toe slopes are commonly gentle and linear in profile.

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.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, that are in soils in extremely small amounts. They are essential to plant growth.

Trash mulch seeding. A soil and water conservation practice involving minimum land preparation prior to the seeding of grasses and legumes so that the ground surface has a protective cover of mulch.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

Watershed. An area of land from which surface water drains into a common outlet, such as a river, lake, or wetland.

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.

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 action of uprooting and tipping over trees by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(See text on page 9 for additional information. Recorded during the period 1961-90 at: MARYSVILLE, OH)

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-----	33.0	16.0	24.5	60	-15	1	1.99	0.97	2.86	5	7.7
February----	36.9	18.6	27.8	64	-9	1	1.96	0.90	2.88	4	5.6
March-------	49.0	28.7	38.9	78	2	32	3.05	1.74	4.22	7	3.5
April-------	61.1	38.3	49.7	84	19	114	3.34	1.69	4.78	6	0.8
May---------	71.8	48.8	60.3	90	29	332	3.79	1.95	5.40	7	0.0
June--------	80.5	57.4	68.9	94	40	568	3.82	2.03	5.39	6	0.0
July--------	83.8	61.6	72.7	95	46	704	3.74	2.13	5.16	6	0.0
August------	82.1	59.6	70.8	94	43	644	3.12	1.56	4.47	6	0.0
September---	75.5	52.9	64.2	91	34	427	2.90	1.35	4.24	5	0.0
October-----	63.5	41.5	52.5	83	21	154	2.41	1.38	3.47	5	0.1
November----	50.2	32.7	41.4	74	13	33	2.96	1.56	4.19	6	1.0
December----	37.6	22.2	29.9	64	-6	5	2.64	1.36	3.75	6	4.4
Yearly:											
Average---	60.4	39.9	50.1	---	---	---	---	---	---	---	---
Extreme---	101	-23	---	96	-16	---	---	---	---	---	---
Total-----	---	---	---	---	---	3016	35.72	30.52	40.55	69	23.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minumum 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

(See text on page 9 for additional information. Recorded during the period 1961-90 at: MARYSVILLE, OH)

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--	April 18	April 29	May 15
2 year in 10 later than--	April 13	April 24	May 10
5 year in 10 later than--	April 4	April 15	April 30
First freezing temperature in fall:			
1 yr in 10 earlier than--	October 19	October 11	September 23
2 yr in 10 earlier than--	October 25	October 16	September 29
5 yr in 10 earlier than--	November 6	October 26	October 11

TABLE 3.--GROWING SEASON

(See text on page 9 for additional information. Recorded during the period 1961-90 at: MARYSVILLE, OH)

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	192	173	135
8 years in 10	200	180	145
5 years in 10	215	193	164
2 years in 10	230	207	182
1 year in 10	238	214	192

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE MAP UNITS

Map symbol	Soil name	Acres	Percent
Ag	Algiers silt loam	343	0.1
BoA	Blount silt loam, 0 to 2 percent slopes	72,305	26.5
BoB	Blount silt loam, 2 to 6 percent slopes	43,715	15.6
BoB2	Blount silt loam, 2 to 6 percent slopes, moderately eroded	407	0.1
Bs	Brookston silty clay loam	17,459	6.2
CeA	Celina silt loam, 0 to 2 percent slopes	67	*
CeB	Celina silt loam, 2 to 6 percent slopes	1,181	0.4
CrA	Crosby silt loam, 0 to 2 percent slopes	9,718	3.5
CrB	Crosby silt loam, 2 to 6 percent slopes	1,040	0.4
Cu	Cut and fill land	176	*
Ee	Eel silt loam	1,721	0.6
FoA	Fox silt loam, 0 to 2 percent slopes	2,362	0.8
FoB	Fox silt loam, 2 to 6 percent slopes	1,314	0.5
FoB2	Fox silt loam, 2 to 6 percent slopes, moderately eroded	166	*
FoC2	Fox silt loam, 6 to 12 percent slopes, moderately eroded	64	*
Gn	Genesee silt loam	3,006	1.1
Gp	Gravel pits	147	*
HeA	Henshaw silt loam, 0 to 2 percent slopes	455	0.2
Ho	Homer silt loam	339	0.1
Ka	Kane silt loam	81	*
KeA	Kendallville silt loam, 0 to 2 percent slopes	106	*
KeB	Kendallville silt loam, 2 to 6 percent slopes	299	0.1
Lc	Lippincott silty clay loam	1,641	0.6
MlB	Miamian silt loam, 2 to 6 percent slopes	566	0.2
MlC2	Miamian silt loam, 6 to 12 percent slopes, moderately eroded	150	*
MlD2	Miamian silt loam, 12 to 18 percent slopes, moderately eroded	54	*
MlF2	Miamian silt loam, 18 to 35 percent slopes, moderately eroded	49	*
Mn	Montgomery silty clay loam	2,093	0.7
MrB	Morley silt loam, 2 to 6 percent slopes	18,899	6.8
MrB2	Morley silt loam, 2 to 6 percent slopes, moderately eroded	2,489	0.9
MrC	Morley silt loam, 6 to 12 percent slopes	652	0.2
MrC2	Morley silt loam, 6 to 12 percent slopes, moderately eroded	5,920	2.1
MrD2	Morley silt loam, 12 to 18 percent slopes, moderately eroded	850	0.3
MrE2	Morley silt loam, 18 to 25 percent slopes, moderately eroded	90	*
MrF2	Morley silt loam, 25 to 50 percent slopes, moderately eroded	53	*
Mu	Muskego muck	135	*
NpA	Nappanee silt loam, 0 to 2 percent slopes	7,570	2.7
NpB	Nappanee silt loam, 2 to 6 percent slopes	8,980	3.2
OdA	Odell silt loam, 0 to 2 percent slopes	142	*
Pa	Paulding silty clay	7,936	2.8
Pm	Pewamo silty clay loam	25,209	9.0
Qu	Quarries	77	*
Ro	Ross silt loam	831	0.3
ScB	St. Clair silt loam, 2 to 6 percent slopes	3,049	1.1
ScB2	St. Clair silt loam, 2 to 6 percent slopes, moderately eroded	725	0.3
ScC	St. Clair silt loam, 6 to 12 percent slopes	114	*
ScC2	St. Clair silt loam, 6 to 12 percent slopes, moderately eroded	706	0.3
Sh	Shoals silt loam	1,538	0.6
SlA	Sleeth silt loam, 0 to 2 percent slopes	322	0.1
So	Sloan silty clay loam	2,610	0.9
W	Water	316	0.1
WaB	Warsaw silt loam, 1 to 4 percent slopes	94	*
Wc	Westland silty clay loam	1,450	0.5
We	Wetzel silty clay loam	25,979	9.3
	Total	279,488	100.0

* Less than 0.1 percent.

TABLE 5.--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. See text on page 89 for additional information.)

Map symbol	Soil name
Ag	Algiers silt loam (Prime farmland if drained)
BoA	Blount silt loam, 0 to 2 percent slopes (Prime farmland if drained)
BoB	Blount silt loam, 2 to 6 percent slopes (Prime farmland if drained)
BoB2	Blount silt loam, 2 to 6 percent slopes, moderately eroded (Prime farmland if drained)
Bs	Brookston silty clay loam (Prime farmland if drained)
CeA	Celina silt loam, 0 to 2 percent slopes
CeB	Celina silt loam, 2 to 6 percent slopes
CrA	Crosby silt loam, 0 to 2 percent slopes (Prime farmland if drained)
CrB	Crosby silt loam, 2 to 6 percent slopes (Prime farmland if drained)
Ee	Eel silt loam
FoA	Fox silt loam, 0 to 2 percent slopes
FoB	Fox silt loam, 2 to 6 percent slopes
FoB2	Fox silt loam, 2 to 6 percent slopes, moderately eroded
Gn	Genesee silt loam
HeA	Henshaw silt loam, 0 to 2 percent slopes (Prime farmland if drained)
Ho	Homer silt loam (Prime farmland if drained)
Ka	Kane silt loam (Prime farmland if drained)
KeA	Kendallville silt loam, 0 to 2 percent slopes
KeB	Kendallville silt loam, 2 to 6 percent slopes
Lc	Lippincott silty clay loam (Prime farmland if drained)
MlB	Miamian silt loam, 2 to 6 percent slopes
Mn	Montgomery silty clay loam (Prime farmland if drained)
MrB	Morley silt loam, 2 to 6 percent slopes
MrB2	Morley silt loam, 2 to 6 percent slopes, moderately eroded
NpA	Nappanee silt loam, 0 to 2 percent slopes (Prime farmland if drained)
NpB	Nappanee silt loam, 2 to 6 percent slopes (Prime farmland if drained)
OdA	Odell silt loam, 0 to 2 percent slopes (Prime farmland if drained)
Pm	Pewamo silty clay loam (Prime farmland if drained)
Ro	Ross silt loam
ScB	St. Clair silt loam, 2 to 6 percent slopes
ScB2	St. Clair silt loam, 2 to 6 percent slopes, moderately eroded
Sh	Shoals silt loam (Prime farmland if drained)
SlA	Sleeth silt loam, 0 to 2 percent slopes (Prime farmland if drained)
So	Sloan silty clay loam (Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season)
WaB	Warsaw silt loam, 1 to 4 percent slopes
Wc	Westland silty clay loam (Prime farmland if drained)
We	Wetzel silty clay loam (Prime farmland if drained)

TABLE 6.--HYDRIC SOILS LIST

(See text on page 91 for additional information.)

Map symbol	Soil name
Bs	Brookston silty clay loam
Lc	Lippincott silty clay loam
Mn	Montgomery silty clay loam
Mu	Muskego muck
Pa	Paulding silty clay
Pm	Pewamo silty clay loam
So	Sloan silty clay loam
Wc	Westland silty clay loam
We	Wetzel silty clay loam

TABLE 7.--NON-HYDRIC MAP UNITS WITH HYDRIC COMPONENTS

(See text on page 91 for additional information.)

Map symbol and map unit name	Hydric Component	Landform
Ag:		
Algiers silt loam	Sloan	oxbow, slough.
BoA:		
Blount silt loam, 0 to 2 percent slopes	Pewamo	depression, swale.
	Wetzel	depression, swale.
BoB:		
Blount silt loam, 2 to 6 percent slopes	Pewamo	depression, drainageway.
	Wetzel	depression, drainageway.
BoB2:		
Blount silt loam, 2 to 6 percent slopes, moderately eroded	Wetzel	depression, drainageway.
	Pewamo	depression, drainageway.
CrA:		
Crosby silt loam, 0 to 2 percent slopes	Brookston	drainageway.
CrB:		
Crosby silt loam, 2 to 6 percent slopes	Brookston	drainageway.
Ee:		
Eel silt loam	Sloan	oxbow, slough.
Gn:		
Genesee silt loam	Sloan	oxbow, slough.
HeA:		
Henshaw silt loam, 0 to 2 percent slopes	Montgomery	depression.
Ho:		
Homer silt loam	Lippincott	depression.
Ka:		
Kane silt loam	ponded areas	depression.
MrB:		
Morley silt loam, 2 to 6 percent slopes	Pewamo	drainageway.
	Wetzel	drainageway.
MrB2:		
Morley silt loam, 2 to 6 percent slopes, moderately eroded	Pewamo	drainageway.
	Wetzel	drainageway.
NpA:		
Nappanee silt loam, 0 to 2 percent slopes	Paulding	drainageway.
NpB:		
Nappanee silt loam, 2 to 6 percent slopes	Paulding	drainageway.
OdA:		
Odell silt loam, 0 to 2 percent slopes	Brookston	depression.
Ro:		
Ross silt loam	Lippincott	depression.
ScB:		
St. Clair silt loam, 2 to 6 percent slopes	Paulding	drainageway.
ScB2:		
St. Clair silt loam, 2 to 6 percent slopes, moderately eroded	Paulding	drainageway.
Sh:		
Shoals silt loam	Sloan	oxbow, slough.
SlA:		
Sleeth silt loam, 0 to 2 percent slopes	Westland	depression.

TABLE 8.--CROPLAND LIMITATIONS AND HAZARDS

(See text on page 95 for a description of the limitations and hazards listed in this table. Only soils suitable for cultivated crops are listed in this table.)

Soil name and map symbol	Cropland limitations and hazards
Ag:	
Algiers	Occasional flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action, surface crusting.
BoA:	
Blount	Seasonal high water table, surface compaction, frost action, surface crusting, limited available water capacity, root restrictive layer, high clay content.
BoB:	
Blount	Seasonal high water table, surface compaction, frost action, surface crusting, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
BoB2:	
Blount	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, frost action, fair tilth, surface crusting, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
Bs:	
Brookston	Ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth.
CeA:	
Celina	Seasonal high water table, surface compaction, frost action, surface crusting, root restrictive layer, high clay content.
CeB:	
Celina	Seasonal high water table, surface compaction, frost action, surface crusting, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
CrA:	
Crosby	Seasonal high water table, surface compaction, frost action, surface crusting, limited available water capacity, root restrictive layer, high clay content.
CrB:	
Crosby	Seasonal high water table, surface compaction, frost action, surface crusting, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
Ee:	
Eel	Occasional flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action.
FoA:	
Fox	Surface compaction, high potential for ground-water pollution, surface crusting, limited available water capacity, high clay content.
FoB:	
Fox	Surface compaction, high potential for ground-water pollution, surface crusting, erosion hazard, limited available water capacity, high clay content.

TABLE 8.--CROPLAND LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Cropland limitations and hazards
FoB2:	
Fox	Part of the surface layer removed by erosion, surface compaction, high potential for ground-water pollution, fair tilth, surface crusting, erosion hazard, limited available water capacity, high clay content.
FoC2:	
Fox	Part of the surface layer removed by erosion, surface compaction, high potential for ground-water pollution, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, high clay content.
Gn:	
Genesee	Occasional flooding, surface compaction, surface crusting.
HeA:	
Henshaw	Seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action, surface crusting.
Ho:	
Homer	Seasonal high water table, surface compaction, high potential for ground-water pollution, moderate potential for ground-water pollution, frost action, surface crusting.
Ka:	
Kane	Seasonal high water table, surface compaction, high potential for ground-water pollution, moderate potential for ground-water pollution, frost action.
KeA:	
Kendallville	Surface compaction, surface crusting, limited available water capacity, root restrictive layer.
KeB:	
Kendallville	Surface compaction, surface crusting, erosion hazard, limited available water capacity, root restrictive layer.
Lc:	
Lippincott	Ponding, surface compaction, high potential for ground-water pollution, moderate potential for ground-water pollution, fair tilth, limited available water capacity, high clay content.
MlB:	
Miamian	Surface compaction, surface crusting, erosion hazard, limited available water capacity, root restrictive layer.
MlC2:	
Miamian	Part of the surface layer removed by erosion, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, root restrictive layer.
MlD2:	
Miamian	Part of the surface layer removed by erosion, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, root restrictive layer.
Mn:	
Montgomery	Ponding, surface compaction, moderate potential for ground-water pollution, poor tilth, frost action, clodding, high clay content.

TABLE 8.--CROPLAND LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Cropland limitations and hazards
MrB:	
Morley	Seasonal high water table, surface compaction, surface crusting, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
MrB2:	
Morley	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, fair tilth, surface crusting, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
MrC:	
Morley	Seasonal high water table, surface compaction, surface crusting, easily eroded, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
MrC2:	
Morley	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
MrD2:	
Morley	Part of the surface layer removed by erosion, seasonal high water table, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, root restrictive layer, high clay content.
Mu:	
Muskego	Ponding, moderate potential for ground-water pollution, excessive acidity, frost action, subsidence of the muck, wind erosion.
NpA:	
Nappanee	Seasonal high water table, surface compaction, surface crusting, limited available water capacity, restricted permeability, root restrictive layer, high clay content.
NpB:	
Nappanee	Seasonal high water table, surface compaction, surface crusting, erosion hazard, limited available water capacity, restricted permeability, root restrictive layer, high clay content.
OdA:	
Odell	Seasonal high water table, surface compaction, frost action, surface crusting, limited available water capacity, root restrictive layer.
Pa:	
Paulding	Ponding, moderate potential for ground-water pollution, poor tilth, limited available water capacity, clodding, root restrictive layer, very high clay content.
Pm:	
Pewamo	Ponding, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth, clodding, high clay content.
Ro:	
Ross	Occasional flooding, surface compaction.

TABLE 8.--CROPLAND LIMITATIONS AND HAZARDS--Continued

Soil name and map symbol	Cropland limitations and hazards
ScB:	
St. Clair	Surface compaction, surface crusting, erosion hazard, limited available water capacity, restricted permeability, root restrictive layer, high clay content.
ScB2:	
St. Clair	Part of the surface layer removed by erosion, surface compaction, fair tilth, surface crusting, erosion hazard, limited available water capacity, restricted permeability, root restrictive layer, high clay content.
ScC:	
St. Clair	Surface compaction, surface crusting, easily eroded, erosion hazard, limited available water capacity, restricted permeability, root restrictive layer, high clay content.
ScC2:	
St. Clair	Part of the surface layer removed by erosion, surface compaction, fair tilth, surface crusting, easily eroded, erosion hazard, limited available water capacity, restricted permeability, root restrictive layer, high clay content.
Sh:	
Shoals	Occasional flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action.
SlA:	
Sleeth	Seasonal high water table, surface compaction, high potential for ground-water pollution, moderate potential for ground-water pollution, frost action, surface crusting.
So:	
Sloan	Frequent flooding, seasonal high water table, surface compaction, moderate potential for ground-water pollution, frost action, fair tilth.
WaB:	
Warsaw	Surface compaction, high potential for ground-water pollution, erosion hazard.
Wc:	
Westland	Ponding, surface compaction, high potential for ground-water pollution, moderate potential for ground-water pollution, frost action, fair tilth, high clay content.
We:	
Wetzel	Ponding, surface compaction, moderate potential for ground-water pollution, poor tilth, frost action, clodding, high clay content.

TABLE 9.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. See text on page 97 for additional information.)

Map symbol and soil name	Land capability	Corn	Oats	Orchardgrass-alfalfa hay	Soybeans	Winter wheat
		Bu	Bu	Tons	Bu	Bu
Ag: Algiers	2w	135.0	80.0	---	43.0	---
BoA: Blount	2w	142.0	64.0	4.3	45.0	67.0
BoB: Blount	2e	130.0	63.0	4.3	42.0	62.0
BoB2: Blount	2e	126.0	61.0	4.1	40.0	59.0
Bs: Brookston	2w	161.0	---	---	51.0	76.0
CeA: Celina	1	137.0	80.0	---	44.0	65.0
CeB: Celina	2e	127.0	75.0	---	41.0	60.0
CrA: Crosby	2w	143.0	---	3.4	46.0	68.0
CrB: Crosby	2e	132.0	---	3.4	42.0	62.0
Cu: Cut and fill land	---	---	---	---	---	---
Ee: Eel	2w	134.0	---	---	42.0	---
FoA: Fox	2s	114.0	75.0	---	36.0	55.0
FoB: Fox	2e	101.0	75.0	---	32.0	49.0
FoB2: Fox	2e	99.0	67.0	---	32.0	48.0
FoC2: Fox	3e	98.0	31.0	---	---	47.0
Gn: Genesee	2w	124.0	---	4.0	40.0	---
Gp: Gravel Pits	---	---	---	---	---	---
HeA: Henshaw	2w	140.0	---	---	45.0	66.0
Ho: Homer	2w	145.0	---	---	46.0	69.0

TABLE 9.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Oats	Orchardgrass-alfalfa hay	Soybeans	Winter wheat
		Bu	Bu	Tons	Bu	Bu
Ka:						
Kane	2w	148.0	76.0	4.8	47.0	70.0
KeA:						
Kendallville	1	122.0	---	5.5	39.0	59.0
KeB:						
Kendallville	2e	114.0	---	5.5	36.0	55.0
Lc:						
Lippincott	2w	156.0	---	---	50.0	74.0
MlB:						
Miamian	2e	121.0	80.0	4.5	38.0	58.0
MlC2:						
Miamian	3e	106.0	65.0	4.0	34.0	51.0
MlD2:						
Miamian	4e	---	---	---	---	---
MlF2:						
Miamian	6e	---	---	---	---	---
Mn:						
Montgomery	3w	152.0	---	4.0	48.0	72.0
MrB:						
Morley	2e	119.0	63.0	4.3	38.0	57.0
MrB2:						
Morley	2e	112.0	61.0	4.1	36.0	54.0
MrC:						
Morley	3e	108.0	62.0	4.2	34.0	52.0
MrC2:						
Morley	3e	104.0	60.0	4.0	33.0	50.0
MrD2:						
Morley	4e	---	---	---	---	---
MrE2:						
Morley	6e	---	---	---	---	---
MrF2:						
Morley	7e	---	---	---	---	---
Mu:						
Muskego	3w	129.0	70.0	---	41.0	61.0
NpA:						
Nappanee	3w	111.0	90.0	---	35.0	53.0
NpB:						
Nappanee	3e	109.0	85.0	---	35.0	52.0
OdA:						
Odell	2w	160.0	---	4.3	51.0	75.0
Pa:						
Paulding	3w	117.0	56.0	---	37.0	55.0

TABLE 9.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Corn	Oats	Orchardgrass-alfalfa hay	Soybeans	Winter wheat
		Bu	Bu	Tons	Bu	Bu
Pm:						
Pewamo	2w	158.0	100.0	---	50.0	75.0
Qu:						
Quarries	---	---	---	---	---	---
Ro:						
Ross	2w	155.0	---	---	49.0	---
ScB:						
St. Clair	3e	96.0	65.0	---	31.0	46.0
ScB2:						
St. Clair	3e	95.0	55.0	---	30.0	45.0
ScC:						
St. Clair	4e	93.0	55.0	---	30.0	45.0
ScC2:						
St. Clair	4e	91.0	50.0	---	29.0	44.0
Sh:						
Shoals	2w	139.0	---	4.1	44.0	---
SlA:						
Sleeth	2w	147.0	---	---	47.0	69.0
So:						
Sloan	3w	153.0	---	---	48.0	---
W:						
Water	---	---	---	---	---	---
WaB:						
Warsaw	2e	116.0	---	3.3	37.0	55.0
Wc:						
Westland	2w	163.0	---	---	52.0	77.0
We:						
Wetzel	2w	150.0	78.0	---	48.0	71.0

Table 10.—CROP YIELD INDEX

(Estimated yields for soils with a yield index of 100 are: corn - 163 bushels; soybeans - 52 bushels; and wheat - 77 bushels. Dashes indicate that the soil is not suited to the crop or the crop generally is not grown on the soil. See text on page 97 for additional information.)

Map symbol and soil name	Corn	Soybeans	Wheat
Ag:			
Algiers	83	82	--
BoA:			
Blount	87	87	87
BoB:			
Blount	80	80	80
BoB2:			
Blount	77	77	77
Bs:			
Brookston	99	99	99
CeA:			
Celina	84	84	84
CeB:			
Celina	78	78	78
CrA:			
Crosby	88	88	88
CrB:			
Crosby	81	81	81
Cu:			
Cut and fill land	--	--	--
Ee:			
Eel	82	81	--
FoA:			
Fox	70	70	71
FoB:			
Fox	62	62	63
FoB2:			
Fox	61	61	62
FoC2:			
Fox	60	60	61
Gn:			
Genesse	76	76	--
Gp:			
Gravel pits	--	--	--
HeA:			
Henshaw	86	86	86
Ho:			
Homer	89	89	89

Table 10.--CROP YIELD INDEX--Continued

Map symbol and soil name	Corn	Soybeans	Wheat
Ka:			
Kane	91	91	91
KeA:			
Kendallville	75	75	76
KeB:			
Kendallville	70	70	71
Lc:			
Lippincott	96	96	96
MlB:			
Miamian	74	74	75
MlC2:			
Miamian	65	65	66
MlD2:			
Miamian	--	--	--
MlF2:			
Miamian	--	--	--
Mn:			
Montgomery	93	93	93
MrB:			
Morley	73	73	74
MrB2:			
Morley	69	69	70
MrC:			
Morley	66	66	67
MrC2:			
Morley	64	64	65
MrD2:			
Morley	--	--	--
MrE2:			
Morley	--	--	--
MrF2:			
Morley	--	--	--
Mu:			
Muskego	79	79	79
NpA:			
Nappanee	68	68	68
NpB:			
Nappanee	67	67	67
OdA:			
Odell	98	98	98
Pa:			
Paulding	72	72	72

Table 10.--CROP YIELD INDEX--Continued

Map symbol and soil name	Corn	Soybeans	Wheat
Pm:			
Pewamo	97	97	97
Qu:			
Quarry	--	--	--
Ro:			
Ross	95	94	--
ScB:			
St. Clair	59	59	60
ScB2:			
St. Clair	58	58	59
ScC:			
St. Clair	57	57	58
ScC2:			
St. Clair	56	56	57
Sh:			
Shoals	85	84	--
SlA:			
Sleeth	90	90	90
So:			
Sloan	94	93	--
W:			
Water	--	--	--
WaB:			
Warsaw	71	71	72
Wc:			
Westland	100	100	100
We:			
Wetzel	92	92	92

TABLE 11.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of entry indicates no acreage. See text on page 97 for additional information.)

Class	Total acreage	Major management concerns (Subclass) Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
	716			
1	173	---	---	---
2	232,582	22,519	207,294	2,362
3	42,373	13,456	29,324	
4	1,724	1,724		
5	---	---	---	---
6	139	139		
7	53	53		
8	---	---	---	---

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. See text on page 106 for additional information.)

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
Ag: Algiers	Slight	Moderate	Slight	Slight	Severe	Northern red oak	76	57	American sycamore, black cherry, black locust, eastern cottonwood, eastern white pine, green ash, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
BoA: Blount	Slight	Slight	Moderate	Severe	Severe	Northern red oak	65	43	Scotch pine, eastern redcedar, eastern white pine.
						Bur oak	---	---	
						Green ash	---	---	
						Pin oak	---	---	
						White oak	65	43	
BoB: Blount	Slight	Slight	Moderate	Severe	Severe	Northern red oak	65	43	Scotch pine, eastern redcedar, eastern white pine.
						Bur oak	---	---	
						Green ash	---	---	
						Pin oak	---	---	
						White oak	65	43	
BoB2: Blount	Slight	Slight	Moderate	Severe	Severe	Northern red oak	65	43	Scotch pine, eastern redcedar, eastern white pine.
						Bur oak	---	---	
						Green ash	---	---	
						Pin oak	---	---	
						White oak	65	43	
Bs: Brookston	Slight	Severe	Severe	Severe	Severe	Northern red oak	78	57	Baldcypress, eastern white pine, red maple, sweetgum, white ash.
						Pin oak	86	72	
						Sweetgum	90	100	
						White oak	75	57	
CeA: Celina	Slight	Slight	Slight	Slight	Severe	Northern red oak	90	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
						Yellow poplar	110	129	

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY—Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
CeB: Celina	Slight	Slight	Slight	Slight	Severe	Northern red oak	90	72	Black walnut, eastern white pine, northern red oak, white ash white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
CrA: Crosby	Slight	Slight	Moderate	Severe	Severe	Northern red oak	75	57	American sycamore, eastern white pine, northern red oak, red maple, white ash, pin oak.
						Pin oak	85	72	
						White oak	75	57	
CrB: Crosby	Slight	Slight	Moderate	Severe	Severe	Northern red oak	75	57	American sycamore, eastern white pine, northern red oak, red maple, white ash, pin oak.
						Pin oak	85	72	
						White oak	75	57	
Cu: Cut and fill land	---	---	---	---	---	------------------	---	---	---
Ee: Eel	Slight	Moderate	Slight	Slight	Severe	Black walnut	---	---	Black locust, black walnut, eastern cottonwood, eastern white pine.
						Eastern cottonwood	---	---	
						White ash	---	---	
FoA: Fox	Slight	Slight	Slight	Slight	Severe	Northern red oak	80	57	Black locust, eastern white pine, white ash.
						Sugar maple	---	---	
						White oak	---	---	
FoB: Fox	Slight	Slight	Slight	Slight	Severe	Northern red oak	80	57	Black locust, eastern white pine, white ash.
						Sugar maple	---	---	
						White oak	---	---	
FoB2: Fox	Slight	Slight	Slight	Slight	Severe	Northern red oak	80	57	Black locust, eastern white pine, white ash.
						Sugar maple	---	---	
						White oak	---	---	

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns					Potential productivity			Suggested trees to plant
	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index	Volume of wood fiber	
FoC2: Fox	Slight	Slight	Slight	Slight	Severe	Northern red oak	80	57	Black locust, eastern white pine, white ash.
						Sugar maple	---	---	
						White oak	---	---	
Gn: Genesee	Slight	Moderate	Slight	Slight	Severe	------------------	---	---	Black locust, black walnut, eastern white pine.
Gp: Gravel pits	---	---	---	---	---	------------------	---	---	---
HeA: Henshaw	Slight	Moderate	Slight	Slight	Severe	White oak	---	---	Eastern cottonwood, eastern white pine, green ash, sweetgum.
						American sycamore	---	---	
						Common hackberry	---	---	
						Green ash	---	---	
						Pin oak	95	57	
						Red maple	---	---	
						Sweetgum	95	114	
Ho: Homer	Slight	Slight	Slight	Slight	Severe	White oak	70	57	American sycamore, eastern white pine, red maple, white ash.
						Pin oak	85	72	
						Sweetgum	80	86	
Ka: Kane	---	---	---	---	---	------------------	---	---	---
KeA: Kendallville	Slight	Slight	Slight	Slight	Moderate	Northern red oak	87	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
KeB: Kendallville	Slight	Slight	Slight	Slight	Moderate	Northern red oak	87	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
Lc:									
Lippincott	Slight	Severe	Severe	Severe	Severe	Northern red oak	80	57	American sycamore, baldcypress, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum.
						Black cherry	---	---	
						Black oak	80	57	
						Eastern cottonwood	---	---	
						Green ash	---	---	
						Pin oak	88	72	
						Red maple	---	---	
						Swamp white oak	85	72	
MlB:									
Miamian	Slight	Slight	Slight	Slight	Severe	Northern red oak	87	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
MlC2:									
Miamian	Slight	Slight	Slight	Slight	Severe	Northern red oak	87	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
MlD2:									
Miamian	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak	87	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
MlF2:									
Miamian	Moderate	Moderate	Slight	Moderate	Moderate	Northern red oak	87	72	Black walnut, eastern white pine, northern red oak, white ash, white oak.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						White oak	---	---	
Mn:									
Montgomery	Slight	Severe	Severe	Severe	Severe	Pin oak	88	72	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple.
						Sweetgum	90	100	
						White oak	75	57	

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
MrB:									
Morley	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	
MrB2:									
Morley	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	
MrC:									
Morley	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	
MrC2:									
Morley	Slight	Slight	Slight	Slight	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	
MrD2:									
Morley	Moderate	Moderate	Slight	Moderate	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	
MrE2:									
Morley	Moderate	Moderate	Moderate	Moderate	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	
MrF2:									
Morley	Severe	Severe	Slight	Moderate	Moderate	Northern red oak	80	57	Norway spruce, black walnut, eastern white pine, green ash, white oak.
						Black walnut	---	---	
						Bur oak	---	---	
						Shagbark hickory	---	---	
						White oak	80	57	

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
Mu:									
Muskego	Slight	Severe	Severe	Severe	Severe	Black willow	---	---	---
						Green ash	---	---	
						Quaking aspen	56	57	
						Red maple	51	29	
						Silver maple	---	---	
						Tamarack	50	43	
						White ash	52	29	
NpA:									
Nappanee	Slight	Slight	Severe	Severe	Severe	American sycamore	---	---	American sycamore, baldcypress, eastern white pine, red maple, white ash.
						Pin oak	85	72	
						Sweetgum	80	86	
						White oak	75	72	
NpB:									
Nappanee	Slight	Slight	Severe	Severe	Severe	American sycamore	---	---	American sycamore, baldcypress, eastern white pine, red maple, white ash.
						Pin oak	85	72	
						Sweetgum	80	86	
						White oak	75	72	
OdA:									
Odell	---	---	---	---	---	------------------	---	---	---
Pa:									
Paulding	Slight	Severe	Severe	Severe	Severe	Black cherry	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum.
						Eastern cottonwood	---	---	
						Green ash	---	---	
						Pin oak	76	57	
						Red maple	---	---	
						Swamp white oak	65	43	
Pm:									
Pewamo	Slight	Severe	Severe	Severe	Severe	Eastern cottonwood	98	---	Norway spruce, eastern white pine, green ash, red maple, white ash.
						Green ash	---	---	
						Pin oak	90	72	
						Red maple	71	43	
						Swamp white oak	---	---	
						White ash	71	72	
Ro:									
Ross	Slight	Slight	Slight	Slight	Severe	Northern red oak	86	72	Norway spruce, black walnut, eastern white pine, white ash.
						Black cherry	---	---	
						Black walnut	---	---	
						Sugar maple	85	57	
						White ash	---	---	
						White oak	---	---	
ScB:									
St. Clair	Slight	Slight	Severe	Severe	Moderate	Northern red oak	66	43	Eastern white pine.
						Sugar maple	---	---	
						White ash	---	---	
						White oak	62	43	

TABLE 12.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Volume of wood fiber	Suggested trees to plant
ScB2: St. Clair	Slight	Slight	Severe	Severe	Moderate	Northern red oak	66	43	Eastern white pine.
						Sugar maple	---	---	
						White ash	---	---	
						White oak	62	43	
ScC: St. Clair	Slight	Slight	Severe	Severe	Moderate	Northern red oak	66	43	Eastern white pine.
						Sugar maple	---	---	
						White ash	---	---	
						White oak	62	43	
ScC2: St. Clair	Slight	Slight	Severe	Severe	Moderate	Northern red oak	66	43	Eastern white pine.
						Sugar maple	---	---	
						White ash	---	---	
						White oak	62	43	
Sh: Shoals	Slight	Moderate	Moderate	Slight	Severe	Virginia pine	90	129	Pin oak, red maple, swamp chestnut oak, sweetgum.
						Eastern cottonwood	---	---	
						Pin oak	90	72	
						Sweetgum	86	100	
						White ash	---	---	
SlA: Sleeth	Slight	Slight	Slight	Slight	Severe	Pin oak	85	72	American sycamore, baldcypress, eastern white pine, red maple, white ash.
						Sweetgum	80	86	
						White oak	70	57	
So: Sloan	Slight	Severe	Moderate	Moderate	Severe	Eastern cottonwood	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum.
						Green ash	---	---	
						Pin oak	86	72	
						Red maple	---	---	
						Swamp white oak	---	---	
WaB: Warsaw	---	---	---	---	---	------------------	---	---	---
Wc: Westland	Slight	Severe	Severe	Severe	Severe	Pin oak	85	72	Baldcypress, eastern white pine, red maple, sweetgum, white ash.
						Sweetgum	90	100	
						White oak	75	57	
We: Wetzel	Slight	Severe	Severe	Severe	Severe	American sycamore	---	---	American sycamore, eastern cottonwood, green ash, pin oak, red maple, silver maple, swamp white oak, sweetgum.
						Black willow	---	---	
						Eastern cottonwood	90	---	
						Green ash	---	---	
						Pin oak	---	---	
						Red maple	---	---	
						Swamp white oak	70	57	

TABLE 13.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(Absence of an entry indicates that trees generally do not grow to the given height. See text on page 108 for additional information.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Ag: Algiers	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
BoA: Blount	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
BoB: Blount	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
BoB2: Blount	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
Bs: Brookston	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, white fir, northern white-cedar	Norway spruce, eastern white pine	pin oak
CeA: Celina	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
CeB: Celina	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
CrA: Crosby	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
CrB: Crosby	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange,	eastern white pine, pin oak	---
Cu: Cut And Fill Land	---	---	---	---	---
Ee: Eel	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
FoA: Fox	common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	jack pine, red pine, eastern white pine	---	---
FoB: Fox	common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	jack pine, red pine, eastern white pine	---	---

Table 13.--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
FoB2:					
Fox	common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	eastern white pine	---	---
FoC2:					
Fox	common lilac	Washington hawthorn, eastern redcedar, radiant crabapple	eastern white pine	---	---
Gn:					
Genesee	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
Gp:					
Gravel Pits	---	---	---	---	---
HeA:					
Henshaw	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
Ho:					
Homer	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
Ka:					
Kane	---	---	---	---	---
KeA:					
Kendallville	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
KeB:					
Kendallville	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
Lc:					
Lippincott	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce, eastern white pine	pin oak
MlB:					
Miamian	silky dogwood	American cranberrybush	Washington hawthorn, northern white-cedar, blue spruce	Norway spruce	pin oak, eastern white pine
MlC2:					
Miamian	silky dogwood	American cranberrybush	Washington hawthorn, northern white-cedar, blue spruce	Norway spruce	pin oak, eastern white pine
MlD2:					
Miamian	silky dogwood	American cranberrybush	Washington hawthorn, northern white-cedar, blue spruce	Norway spruce	pin oak, eastern white pine
MlF2:					
Miamian	silky dogwood	American cranberrybush	Washington hawthorn, northern white-cedar, blue spruce	Norway spruce	pin oak, eastern white pine

Table 13.--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
Mn:					
Montgomery	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce, eastern white pine	pin oak
MrB:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
MrB2:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
MrC:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
MrC2:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
MrD2:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
MrE2:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
MrF2:					
Morley	American cranberrybush, silky dogwood	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
Mu:					
Muskego	common ninebark, silky dogwood,	nannyberry	tall purple willow	black willow, golden willow	imperial Carolina poplar
NpA:					
Nappanee	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
NpB:					
Nappanee	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
OdA:					
Odell	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine

Table 13.--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
Pa: Paulding	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce, eastern white pine	pin oak
Pm: Pewamo	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce, eastern white pine	pin oak
Qu: Quarries	---	---	---	---	---
Ro: Ross	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce	pin oak, eastern white pine
ScB: St. Clair	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
ScB2: St. Clair	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
ScC: St. Clair	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
ScC2: St. Clair	American cranberrybush	southern arrowwood	Washington hawthorn, eastern redcedar, green ash, osageorange	eastern white pine, pin oak	---
Sh: Shoals	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Austrian pine, Norway spruce	pin oak, eastern white pine
SlA: Sleeth	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Austrian pine, Norway spruce	pin oak, eastern white pine
So: Sloan	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, white fir, northern white-cedar	Norway spruce, eastern white pine	pin oak
WaB: Warsaw	---	---	---	---	---

Table 13.--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
Wc:					
Westland	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce, eastern white pine	pin oak
We:					
Wetzel	silky dogwood	American cranberrybush	Washington hawthorn, blue spruce, northern white-cedar	Norway spruce, eastern white pine	pin oak

TABLE 14.--RECREATIONAL DEVELOPMENT

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text on page 110 for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ag: Algiers	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: flooding, wetness.
BoA: Blount	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
BoB: Blount	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
BoB2: Blount	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Bs: Brookston	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
CeA: Celina	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Slight	Slight
CeB: Celina	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: percs slowly, slope, wetness.	Slight	Slight
CrA: Crosby	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
CrB: Crosby	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Cu: Cut and fill land	---	---	---	---	---
Ee: Eel	Severe: flooding.	Moderate: percs slowly, wetness.	Moderate: flooding, small stones, wetness.	Slight	Moderate: flooding.
FoA: Fox	Slight	Slight	Slight	Slight	Slight
FoB: Fox	Slight	Slight	Moderate: slope.	Slight	Slight

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FoB2: Fox	Slight	Slight	Moderate: slope.	Slight	Slight
FoC2: Fox	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Gn: Genesee	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Gp: Gravel Pits	---	---	---	---	---
HeA: Henshaw	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
Ho: Homer	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
Ka: Kane	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
KeA: Kendallville	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, small stones.	Severe: erodes easily.	Slight
KeB: Kendallville	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope, small stones.	Severe: erodes easily.	Slight
Lc: Lippincott	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MlB: Miamian	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight	Slight
MlC2: Miamian	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MlD2: Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MlF2: Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Mn: Montgomery	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
MrB: Morley	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight	Slight
MrB2: Morley	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly, slope.	Slight	Slight
MrC: Morley	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MrC2: Morley	Moderate: percs slowly, slope.	Moderate: percs slowly, slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
MrD2: Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MrE2: Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MrF2: Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily, slope.	Severe: slope.
Mu: Muskego	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.	Severe: excess humus, ponding.
NpA: Nappanee	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
NpB: Nappanee	Severe: wetness.	Moderate: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
OdA: Odell	Severe: wetness.	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Pa: Paulding	Severe: percs slowly, too clayey, ponding.	Severe: percs slowly, too clayey, ponding.	Severe: percs slowly, too clayey, ponding.	Severe: too clayey, ponding.	Severe: too clayey, ponding.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pm: Pewamo	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Qu: Quarries	---	---	---	---	---
Ro: Ross	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
ScB: St. Clair	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: slope, small stones, wetness.	Severe: erodes easily.	Slight
ScB2: St. Clair	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: slope, small stones, wetness.	Severe: erodes easily.	Slight
ScC: St. Clair	Severe: percs slowly, slope, wetness.	Moderate: slope.	Moderate: slope.	Severe: erodes easily.	Moderate: slope.
ScC2: St. Clair	Moderate: percs slowly, slope, wetness.	Moderate: percs slowly, slope, wetness.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Sh: Shoals	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
SlA: Sleeth	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
So: Sloan	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.
WaB: Warsaw	Slight	Slight	Moderate: slope, small stones.	Slight	Slight
Wc: Westland	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
We: Wetzel	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 15.--WILDLIFE HABITAT

(See text on page 112 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: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Ag: Algiers	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
BoA: Blount	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
BoB: Blount	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
BoB2: Blount	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Bs: Brookston	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
CeA: Celina	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
CeB: Celina	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
CrA: Crosby	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
CrB: Crosby	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Cu: Cut and fill land	---	---	---	---	---	---	---	---	---	---
Ee: Eel	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
FoA: Fox	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
FoB: Fox	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
FoB2: Fox	Good	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
FoC2: Fox	Fair	Good	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Gn: Genesee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Gp: Gravel pits	---	---	---	---	---	---	---	---	---	---

TABLE 15.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
HeA: Henshaw	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Ho: Homer	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
Ka: Kane	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
KeA: Kendallville	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
KeB: Kendallville	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
Lc: Lippincott	Poor	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MlB: Miamian	Fair	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
MlC2: Miamian	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
MlD2: Miamian	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
MlF2: Miamian	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Mn: Montgomery	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MrB: Morley	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
MrB2: Morley	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
MrC: Morley	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
MrC2: Morley	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
MrD2: Morley	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
MrE2: Morley	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor

TABLE 15.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MrF2: Morley	Poor	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor
Mu: Muskego	Good	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
NpA: Nappanee	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
NpB: Nappanee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor
OdA: Odell	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
Pa: Paulding	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Pm: Pewamo	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
Qu: Quarries	---	---	---	---	---	---	---	---	---	---
Ro: Ross	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ScB: St. Clair	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ScB2: St. Clair	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor
ScC: St. Clair	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
ScC2: St. Clair	Fair	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor
Sh: Shoals	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair
SlA: Sleeth	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair
So: Sloan	Fair	Fair	Fair	Poor	Poor	Good	Good	Fair	Poor	Good.
W: Water	---	---	---	---	---	---	---	---	---	---
WaB: Warsaw	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor

TABLE 15.--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	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Wc:										
Westland----------	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
We:										
Wetzel------------	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

TABLE 16.--BUILDING SITE DEVELOPMENT

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text on page 114 for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ag: Algiers	Severe: wetness, cutbanks cave.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action, low strength.	Moderate: flooding, wetness.
BoA: Blount	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
BoB: Blount	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
BoB2: Blount	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
Bs: Brookston	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, low strength, ponding.	Severe: ponding.
CeA: Celina	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: frost action, low strength.	Slight
CeB: Celina	Severe: wetness.	Moderate: shrink-swell, wetness.	Severe: wetness.	Moderate: shrink-swell, slope, wetness.	Severe: frost action, low strength.	Slight
CrA: Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
CrB: Crosby	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
Cu: Cut and fill land	---	---	---	---	---	---
Ee: Eel	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action, low strength.	Moderate: flooding.
FoA: Fox	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight
FoB: Fox	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight

TABLE 16.--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
FoB2:						
Fox	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight
FoC2:						
Fox	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, shrink-swell, slope.	Moderate: slope.
Gn:						
Genesee	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Gp:						
Gravel Pits	---	---	---	---	---	---
HeA:						
Henshaw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
Ho:						
Homer	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
Ka:						
Kane	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
KeA:						
Kendallville	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight
KeB:						
Kendallville	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight
Lc:						
Lippincott	Severe: ponding, cutbanks cave.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
MlB:						
Miamian	Moderate: too clayey, dense layer.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.	Slight
MlC2:						
Miamian	Moderate: slope, too clayey, dense layer.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MlD2:						
Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MlF2:						
Miamian	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

TABLE 16.--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
Mn:						
Montgomery	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: low strength, shrink-swell, ponding.	Severe: ponding.
MrB:						
Morley	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight
MrB2:						
Morley	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight
MrC:						
Morley	Moderate: slope, too clayey, wetness.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope, wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
MrC2:						
Morley	Moderate: slope, too clayey, wetness.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope, wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
MrD2:						
Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MrE2:						
Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MrF2:						
Morley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Mu:						
Muskego	Severe: exces humus, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: subsides, ponding.	Severe: frost action, subsides, ponding.	Severe: excess humus, ponding.
NpA:						
Nappanee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness, droughty.
NpB:						
Nappanee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness, droughty.
OdA:						
Odell	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Pa:						
Paulding	Severe: ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: shrink-swell, ponding.	Severe: low strength, shrink-swell, ponding.	Severe: too clayey, ponding.

TABLE 16.--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
Pm: Pewamo	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, low strength, ponding.	Severe: ponding.
Qu: Quarries	---	---	---	---	---	---
Ro: Ross	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
ScB: St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight
ScB2: St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight
ScC: St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
ScC2: St. Clair	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Sh: Shoals	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action, wetness.	Severe: wetness.
SlA: Sleeth	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength,	Moderate: wetness.
So: Sloan	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, low strength, wetness.	Severe: flooding, wetness.
W: Water	---	---	---	---	---	---
WaB: Warsaw	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight
Wc: Westland	Severe: ponding, cutbanks cave.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, ponding.	Severe: ponding.
We: Wetzel	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, low strength, ponding.	Severe: ponding.

TABLE 17.--SANITARY FACILITIES

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text on page 115 for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ag:					
Algiers	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
BoA:					
Blount	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
BoB:					
Blount	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
BoB2:					
Blount	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bs:					
Brookston	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
CeA:					
Celina	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: too clayey, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
CeB:					
Celina	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: too clayey, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
CrA:					
Crosby	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
CrB:					
Crosby	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Cu:					
Cut and fill land	---	---	---	---	---
Ee:					
Eel	Severe: flooding, percs slowly, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
FoA:					
Fox	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.

TABLE 17.--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
FoB:					
Fox	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
FoB2:					
Fox	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
FoC2:					
Fox	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
Gn:					
Genesee	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good
Gp:					
Gravel Pits	---	---	---	---	---
HeA:					
Henshaw	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ho:					
Homer	Severe: wetness. poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, small stones, too sandy.
Ka:					
Kane	Severe: wetness. poor filter.	Severe: seepage, wetness.	Severe: seepage, too sandy, wetness.	Severe: seepage, wetness.	Poor: seepage, small stones, too sandy.
KeA:					
Kendallville	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
KeB:					
Kendallville	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Lc:					
Lippincott	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, too sandy, ponding.	Severe: seepage, ponding.	Poor: small stones, too clayey, ponding.
MlB:					
Miamian	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: small stones, too clayey.

TABLE 17.--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
MlC2:					
Miamian	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, small stones, too clayey.
MlD2:					
Miamian	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MlF2:					
Miamian	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Mn:					
Montgomery	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: hard to pack, too clayey, ponding.
MrB:					
Morley	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey, wetness.	Slight	Fair: too clayey, wetness.
MrB2:					
Morley	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey, wetness.	Slight	Fair: too clayey, wetness.
MrC:					
Morley	Severe: percs slowly, wetness.	Severe: slope.	Moderate: slope, too clayey, wetness.	Moderate: slope.	Fair: slope, too clayey, wetness.
MrC2:					
Morley	Severe: percs slowly, wetness.	Severe: slope.	Moderate: slope, too clayey, wetness.	Moderate: slope.	Fair: slope, too clayey, wetness.
MrD2:					
Morley	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MrE2:					
Morley	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MrF2:					
Morley	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

TABLE 17.--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
Mu:					
Muskego	Severe: subsides, ponding.	Severe: excess humus, seepage, ponding.	Severe: excess humus, ponding.	Severe: seepage, ponding.	Poor: hard to pack, ponding.
NpA:					
Nappanee	Severe: percs slowly, wetness.	Slight	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
NpB:					
Nappanee	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
OdA:					
Odell	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pa:					
Paulding	Severe: percs slowly, ponding.	Slight	Severe: too clayey, ponding.	Severe: ponding.	Poor: hard to pack, too clayey, ponding.
Pm:					
Pewamo	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: hard to pack, too clayey, ponding.
Qu:					
Quarries	---	---	---	---	---
Ro:					
Ross	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Good
ScB:					
St. Clair	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: hard to pack, too clayey.
ScB2:					
St. Clair	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: hard to pack, too clayey.
ScC:					
St. Clair	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: slope, wetness.	Poor: hard to pack, too clayey.
ScC2:					
St. Clair	Severe: percs slowly, wetness.	Severe: slope.	Severe: too clayey.	Moderate: slope, wetness.	Poor: hard to pack, too clayey.

TABLE 17.--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
Sh:					
Shoals	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
SlA:					
Sleeth	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
So:					
Sloan	Severe: flooding, percs slowly, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
W:					
Water	---	---	---	---	---
WaB:					
Warsaw	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, small stones, too sandy.
Wc:					
Westland	Severe: ponding.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
We:					
Wetzel	Severe: percs slowly, ponding.	Severe: ponding.	Severe: too clayey, ponding.	Severe: ponding.	Poor: hard to pack, too clayey, ponding.

TABLE 18.--CONSTRUCTION MATERIALS

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text on page 117 for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Ag:				
Algiers	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
BoA:				
Blount	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BoB:				
Blount	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BoB2:				
Blount	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bs:				
Brookston	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CeA:				
Celina	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CeB:				
Celina	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CrA:				
Crosby	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CrB:				
Crosby	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Cu:				
Cut and fill land	---	---	---	---
Ee:				
Eel	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
FoA:				
Fox	Good	Probable	Probable	Poor: area reclaim, small stones.
FoB:				
Fox	Good	Probable	Probable	Poor: area reclaim, small stones.
FoB2:				
Fox	Good	Probable	Probable	Poor: area reclaim, small stones.

TABLE 18.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FoC2: Fox	Good	Probable	Probable	Poor: area reclaim, small stones.
Gn: Genesee	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Gp: Gravel pits	---	---	---	---
HeA: Henshaw	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ho: Homer	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
Ka: Kane	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
KeA: Kendallville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
KeB: Kendallville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lc: Lippincott	Poor: wetness.	Probable	Probable	Poor: area reclaim, small stones, wetness.
MlB: Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MlC2: Miamian	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MlD2: Miamian	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
MlF2: Miamian	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Mn: Montgomery	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

TABLE 18.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MrB:				
Morley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MrB2:				
Morley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MrC:				
Morley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MrC2:				
Morley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MrD2:				
Morley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
MrE2:				
Morley	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
MrF2:				
Morley	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Mu:				
Muskego	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
NpA:				
Nappanee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
NpB:				
Nappanee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
OdA:				
Odell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, too clayey.
Pa:				
Paulding	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Pm:				
Pewamo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey, wetness.

TABLE 18.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Qu: Quarries	---	---	---	---
Ro: Ross	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
ScB: St. Clair	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ScB2: St. Clair	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ScC: St. Clair	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ScC2: St. Clair	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Sh: Shoals	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
SlA: Sleeth	Fair: wetness.	Probable	Probable	Poor: area reclaim.
So: Sloan	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
WaB: Warsaw	Good	Probable	Probable	Poor: area reclaim, small stones.
Wc: Westland	Poor: wetness.	Probable	Probable	Poor: area reclaim, wetness.
We: Wetzel	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 19.--WATER MANAGEMENT

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text on page 118 for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Ag: Algiers	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Limitation: flooding, frost action.	Limitation: erodes easily, flooding, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
BoA: Blount	Slight	Moderate: piping, wetness.	Severe: no water.	Limitation: frost action, percs slowly.	Limitation: percs slowly, wetness.	Limitation: erodes easily, percs slowly, wetness.	Limitation: erodes easily, rooting depth, wetness.
BoB: Blount	Moderate: slope.	Moderate: piping, wetness.	Severe: no water.	Limitation: frost action, percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, percs slowly, wetness.	Limitation: erodes easily, rooting depth, wetness.
BoB2: Blount	Moderate: slope.	Moderate: piping, wetness.	Severe: no water.	Limitation: frost action, percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, percs slowly, wetness.	Limitation: erodes easily, rooting depth, wetness.
Bs: Brookston	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Limitation: frost action, ponding.	Limitation: ponding.	Limitation: ponding.	Limitation: wetness.
CeA: Celina	Slight	Severe: piping.	Severe: no water.	Limitation: frost action.	Limitation: wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, rooting depth.
CeB: Celina	Moderate: slope.	Severe: piping.	Severe: no water.	Limitation: frost action, slope.	Limitation: slope, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, rooting depth.
CrA: Crosby	Slight	Severe: piping.	Severe: no water.	Limitation: frost action, percs slowly.	Limitation: percs slowly, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, rooting depth, wetness.
CrB: Crosby	Moderate: slope.	Severe: piping.	Severe: no water.	Limitation: frost action, percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, rooting depth, wetness.
Cu: Cut and fill land	---	---	---	---	---	---	---
Ee: Eel	Moderate: seepage.	Moderate: piping, thin layer, wetness.	Severe: slow refill.	Limitation: flooding, frost action.	Limitation: flooding, wetness.	Limitation: wetness.	Favorable
FoA: Fox	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Limitation: deep to water.	Favorable	Limitation: too sandy.	Favorable
FoB: Fox	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Limitation: deep to water.	Limitation: slope.	Limitation: too sandy.	Favorable

TABLE 19.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
FoB2: Fox	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Limitation: deep to water.	Limitation: slope.	Limitation: too sandy.	Favorable
FoC2: Fox	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Limitation: deep to water.	Limitation: slope.	Limitation: slope, too sandy.	Limitation: slope.
Gn: Genesee	Moderate: seepage.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: flooding.	Limitation: erodes easily.	Limitation: erodes easily.
Gp: Gravel Pits	---	---	---	---	---	---	---
HeA: Henshaw	Slight	Severe: piping, wetness.	Severe: slow refill.	Favorable	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
Ho: Homer	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Limitation: frost action, cutbanks cave.	Limitation: wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
Ka: Kane	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Limitation: frost action, cutbanks cave.	Limitation: wetness.	Limitation: too sandy, wetness.	Limitation: wetness.
KeA: Kendallville	Moderate: seepage.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: rooting depth.	Limitation: erodes easily.	Limitation: erodes easily, rooting depth.
KeB: Kendallville	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: rooting depth, slope.	Limitation: erodes easily.	Limitation: erodes easily, rooting depth.
Lc: Lippincott	Severe: seepage.	Severe: seepage, ponding.	Severe: cutbanks cave.	Limitation: ponding, cutbanks cave.	Limitation: ponding.	Limitation: ponding.	Limitation: wetness.
MlB: Miamian	Moderate: slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: erodes easily, rooting depth, slope.	Limitation: erodes easily.	Limitation: erodes easily, rooting depth.
MlC2: Miamian	Severe: slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: erodes easily, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
MlD2: Miamian	Severe: slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: erodes easily, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
MlF2: Miamian	Severe: slope.	Severe: piping.	Severe: no water.	Limitation: deep to water.	Limitation: erodes easily, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.

TABLE 19.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Mn: Montgomery-------	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Limitation: percs slowly, ponding.	Limitation: percs slowly, ponding.	Limitation: erodes easily, percs slowly, ponding.	Limitation: erodes easily, percs slowly wetness.
MrB: Morley-----------	Moderate: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily.	Limitation: erodes easily, rooting depth.
MrB2: Morley-----------	Moderate: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily.	Limitation: erodes easily, rooting depth.
MrC: Morley-----------	Severe: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
MrC2: Morley-----------	Severe: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
MrD2: Morley-----------	Severe: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
MrE2: Morley-----------	Severe: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
MrF2: Morley-----------	Severe: slope.	Slight	Severe: no water.	Limitation: deep to water.	Limitation: percs slowly, rooting depth, slope.	Limitation: erodes easily, slope.	Limitation: erodes easily, rooting depth, slope.
Mu: Muskego----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Limitation: percs slowly, ponding.	Limitation: percs slowly, soil blowing, ponding.	Limitation: percs slowly, soil blowing, ponding.	Limitation: percs slowly wetness.
NpA: Nappanee---------	Slight	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly.	Limitation: wetness, droughty.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
NpB: Nappanee---------	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: slope, wetness, droughty.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
OdA: Odell------------	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Limitation: frost action, percs slowly.	Limitation: percs slowly, wetness.	Limitation: erodes easily, percs slowly, wetness.	Limitation: erodes easily, rooting depth, wetness.

TABLE 19.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Pa: Paulding	Slight	Severe: hard to pack, ponding.	Severe: no water.	Limitation: percs slowly, ponding.	Limitation: percs slowly, slow intake ponding.	Limitation: percs slowly, ponding.	Limitation: percs slowly wetness.
Pm: Pewamo	Slight	Severe: ponding.	Severe: slow refill.	Limitation: frost action, ponding.	Limitation: ponding.	Limitation: erodes easily, ponding.	Limitation: erodes easily, wetness.
Qu: Quarries	---	---	---	---	---	---	---
Ro: Ross	Severe: seepage.	Severe: piping.	Moderate: slow refill, deep to water.	Limitation: deep to water.	Limitation: flooding.	Favorable	Favorable
ScB: St. Clair	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, rooting depth.
ScB2: St. Clair	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, rooting depth.
ScC: St. Clair	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, slope, wetness.	Limitation: erodes easily, rooting depth. slope.
ScC2: St. Clair	Severe: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Limitation: percs slowly, slope.	Limitation: percs slowly, slope, wetness.	Limitation: erodes easily, slope, wetness.	Limitation: erodes easily, rooting depth. slope.
Sh: Shoals	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Limitation: flooding, frost action.	Limitation: erodes easily, flooding, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
SlA: Sleeth	Severe: seepage.	Severe: wetness.	Severe: cutbanks cave.	Limitation: frost action.	Limitation: wetness.	Limitation: wetness.	Limitation: wetness.
So: Sloan	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Limitation: flooding, frost action.	Limitation: flooding, wetness.	Limitation: erodes easily, wetness.	Limitation: erodes easily, wetness.
W: Water	---	---	---	---	---	---	---
WaB: Warsaw	Severe: seepage.	Severe: seepage.	Severe: no water.	Limitation: deep to water.	Favorable	Limitation: too sandy.	Favorable
Wc: Westland	Severe: seepage.	Severe: thin layer, ponding.	Severe: cutbanks cave.	Limitation: frost action, ponding.	Limitation: ponding.	Limitation: ponding.	Limitation: wetness.

TABLE 19.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--: Pond reservoir areas	Limitations for--: Embankments, dikes, and levees	Limitations for--: Aquifer-fed excavated ponds	Features affecting--: Drainage	Features affecting--: Irrigation	Features affecting--: Terraces and diversions	Features affecting--: Grassed waterways
We:							
Wetzel-----------	Slight	Severe: ponding.	Severe: no water.	Limitation: frost action, percs slowly, ponding.	Limitation: percs slowly, ponding.	Limitation: erodes easily, percs slowly, ponding.	Limitation: erodes easily, rooting depth, wetness.

TABLE 20.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. See text on page 120 for additional information. 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	
Ag:												
Algiers---------	0-19	silt loam	ML	A-4	0	0	100	90-100	85-95	70-85	30-40	4-10
	19-47	silt loam, silty clay loam	CL, ML	A-6, A-4, A-7	0	0	100	90-100	80-95	70-85	30-45	7-19
	47-60	clay loam	CL-ML, CL	A-6	0	0	95-100	95-100	90-100	80-90	30-45	7-19
BoA:												
Blount----------	0-6	silt loam	CL-ML, ML	A-4, A-6	0	0-5	95-100	95-100	90-100	80-95	25-40	8-20
	6-22	silty clay loam, silty clay, clay	CH, CL, CL-ML	A-7, A-6	0-1	0-5	95-100	90-100	80-90	75-85	35-60	15-35
	22-60	clay loam, silty clay loam	CL	A-6, A-7	0-1	0-10	90-100	90-100	80-100	70-90	35-45	10-25
BoB:												
Blount----------	0-6	silt loam	CL	A-4, A-6	0	0-5	95-100	95-100	90-100	80-95	25-40	8-20
	6-22	silty clay loam, silty clay, clay	CH, CL	A-7, A-6	0-1	0-5	95-100	90-100	80-90	75-85	35-60	15-35
	22-60	clay loam, silty clay loam	CL	A-6, A-7	0-1	0-10	90-100	90-100	80-100	70-90	35-45	10-25
BoB2:												
Blount----------	0-4	silt loam	CL	A-4, A-6	0	0-5	95-100	95-100	90-100	80-95	25-40	8-20
	4-20	silty clay loam, silty clay, clay	CH, CL	A-7, A-6	0-1	0-5	95-100	90-100	80-90	75-85	35-60	15-35
	20-60	clay loam, silty clay loam	CL	A-6, A-7	0-1	0-10	90-100	90-100	80-100	70-90	35-45	10-25
Bs:												
Brookston-------	0-11	silty clay loam	CL	A-6	0	0	100	95-100	95-100	75-95	30-40	10-20
	11-34	clay loam, silty clay loam	CL	A-6, A-4	0	0	98-100	85-100	75-95	60-85	25-40	8-20
	34-60	loam, silt loam, silt loam	ML, CL	A-4, A-6	0-1	0-3	90-100	85-95	78-90	55-70	20-30	5-15
CeA:												
Celina----------	0-15	silt loam	CL-ML, ML	A-4	0	0	100	90-100	90-100	70-85	26-40	3-10
	15-32	silty clay loam, silty clay	CL, CL-ML	A-6, A-7	0	0	100	90-100	80-95	70-85	32-48	12-28
	32-60	silt loam	CL, CL-ML	A-4	0	0	75-95	75-90	65-90	50-80	20-36	4-16
CeB:												
Celina----------	0-13	silt loam	CL-ML, ML	A-4	0	0	100	90-100	90-100	70-85	26-40	3-10
	13-32	silty clay loam, silty clay	CL, CL-ML	A-6, A-7	0	0	100	90-100	80-95	70-85	32-48	12-28
	32-60	silt loam	CL, CL-ML	A-4	0	0	75-95	75-90	65-90	50-80	20-36	4-16
CrA:												
Crosby----------	0-7	silt loam	ML	A-4, A-7	0	0	100	95-100	80-100	50-90	15-30	3-15
	7-25	silty clay loam, silty clay, clay	CL-ML, CL	A-6	0	0	90-100	85-100	75-95	65-95	35-50	15-25
	25-60	silt loam	CL, CL-ML	A-4	0	0-3	85-100	80-95	75-90	50-65	15-30	3-15
CrB:												
Crosby----------	0-7	silt loam	ML	A-4, A-7	0	0	100	95-100	80-100	50-90	15-30	3-15
	7-25	silty clay loam, silty clay, clay	CL, CL-ML	A-6	0	0	90-100	85-100	75-95	65-95	35-50	15-25
	25-60	silt loam	CL, CL-ML	A-4	0	0-3	85-100	80-95	75-90	50-65	15-30	3-15

TABLE 20.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Ee:												
Eel	0-18	silt loam	ML	A-4, A-6	0	0	100	100	85-100	60-90	25-40	5-20
	18-40	silt loam, silty clay loam	CL, CL-ML	A-6	0	0	100	100	85-100	70-90	25-50	5-25
	40-60	gravelly loam, silty clay loam			---	---	100	100	85-100	70-90	25-40	5-15
FoA:												
Fox	0-9	silt loam	ML	A-4	0	0	95-100	95-100	90-95	45-65	20-30	2-4
	9-17	silt loam, clay loam, silty clay loam	CL	A-4, A-6	0	0	95-100	95-100	90-95	75-85	25-40	9-20
	17-30	gravelly clay, clay	CL, ML	A-6, A-7	---	---	75-100	60-100	55-95	50-80	38-50	12-23
	30-34	gravelly loam	GC, SC, CL	A-7, A-6, A-2	---	---	55-100	55-100	30-95	15-80	22-45	10-25
	34-60	gravel, sand	GP, SM, GM, SP	A-1, A-2, A-3	0	0	30-100	30-100	15-95	2-20	---	NP
FoB:												
Fox	0-8	silt loam	ML	A-4	0	0	95-100	95-100	90-95	45-65	20-30	2-4
	8-16	silt loam, clay loam, silty clay loam	CL	A-4, A-6	0	0	95-100	95-100	90-95	75-85	25-40	9-20
	16-29	gravelly clay, clay	CL, ML	A-6, A-7	---	---	75-100	60-100	55-95	50-80	38-50	12-23
	29-33	gravelly loam	GC, SC, CL	A-7, A-6, A-2	---	---	55-100	55-100	30-95	15-80	22-45	10-25
	33-60	gravel, sand	GP, SM, GM, SP	A-1, A-2, A-3	0	0	30-100	30-100	15-95	2-20	---	NP
FoB2:												
Fox	0-7	silt loam	ML	A-4	0	0	95-100	95-100	90-95	45-65	20-30	2-4
	7-15	silt loam, clay loam, silty clay loam	CL	A-4, A-6	0	0	95-100	95-100	90-95	75-85	25-40	9-20
	15-28	gravelly clay, clay	CL, ML	A-6, A-7	---	---	75-100	60-100	55-95	50-80	38-50	12-23
	28-32	gravelly loam	GC, SC, CL	A-7, A-6, A-2	---	---	55-100	55-100	30-95	15-80	22-45	10-25
	32-60	gravel, sand	GP, SM, GM, SP	A-1, A-2, A-3	0	0	30-100	30-100	15-95	2-20	---	NP
FoC2:												
Fox	0-6	silt loam	ML	A-4	0	0	95-100	95-100	90-95	45-65	20-30	2-4
	6-14	silt loam, clay loam, silty clay loam	CL	A-4, A-6	0	0	95-100	95-100	90-95	75-85	25-40	9-20
	14-27	gravelly clay, clay	CL, ML	A-6, A-7	---	---	75-100	60-100	55-95	50-80	38-50	12-23
	27-31	gravelly loam	GC, SC, CL	A-7, A-6, A-2	---	---	55-100	55-100	30-95	15-80	22-45	10-25
	31-60	gravel, sand	GP, SM, GM, SP	A-1, A-2, A-3	0	0	30-100	30-100	15-95	2-20	---	NP
Gn:												
Genesee	0-13	silt loam	CL-ML, ML	A-4, A-6	0	0	100	100	90-100	75-85	20-30	5-11
	13-44	silt loam, silty clay loam	CL-ML, CL, ML	A-6, A-4	0	0	100	100	90-100	75-85	20-30	5-11
	44-60	silt loam, stratified gravelly silt loam to sand	SC, SM, ML, CL	A-2, A-6, A-4	0	0	100	90-100	70-80	50-70	15-25	3-8
HeA:												
Henshaw	0-8	silt loam	CL-ML, ML	A-4	0	0	95-100	95-100	90-100	80-100	25-35	3-10
	8-44	silty clay loam	CL, ML	A-6	0	0	95-100	95-100	95-100	85-100	30-40	11-20
	44-60	silty clay loam	CL, CL-ML	A-6	0	0	95-100	90-100	85-100	75-100	25-40	5-15
Ho:												
Homer	0-9	silt loam	CL-ML, ML	A-4	0	0	85-100	85-100	85-100	70-95	15-25	3-8
	9-34	gravelly clay loam, clay, silty clay loam	CL, SC, CH	A-6, A-7	0	0	85-100	75-100	70-100	55-95	35-60	15-30
	34-60	sand, gravel	GM, GW, SM, SW	A-1	0	1-10	30-70	25-55	7-20	2-10	15-20	NP-3

TABLE 20.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
Ka:												
Kane------------	0-13	silt loam	CL, CL-ML	A-4, A-6	0	0	95-100	95-100	90-100	75-95	25-35	5-15
	13-31	clay loam, clay	ML, CL	A-7, A-6	0	0	95-100	95-100	90-100	80-95	35-45	10-20
	31-39	sandy clay loam, sandy loam, gravelly silt loam	SC, CL	A-6, A-4	0-1	0-5	90-95	85-95	70-90	40-70	20-35	8-15
	39-60	stratified sand to gravel, gravel	SP, GP, GP-GM, SP-SM	A-1	0-1	0-10	30-70	30-55	10-30	2-12	5-15	NP
KeA:												
Kendallville----	0-9	silt loam	ML	A-4, A-6	---	0-5	90-100	80-100	75-95	70-90	26-40	4-12
	9-20	clay loam	CL, CL-ML	A-4, A-6	0	0	100	80-100	60-70	35-50	25-40	5-15
	20-29	gravelly clay	CL, ML	A-7, A-6	---	0	70-100	60-95	50-80	45-75	25-40	5-15
	29-60	clay loam, loam	ML, CL-ML, CL	A-4, A-6	---	0-5	90-100	80-95	60-90	55-75	20-35	3-15
KeB:												
Kendallville----	0-9	silt loam	ML	A-6, A-4	---	0-5	90-100	80-100	75-95	70-90	26-40	4-12
	9-20	clay loam	CL-ML, CL	A-4, A-6	0	0	100	80-100	60-70	35-50	25-40	5-15
	20-29	gravelly clay	CL, ML	A-6, A-7	---	0	70-100	60-95	50-80	45-75	25-40	5-15
	29-60	clay loam, loam	CL, ML, CL-ML	A-4, A-6	---	0-5	90-100	80-95	60-90	55-75	20-35	3-15
Lc:												
Lippincott------	0-11	silty clay loam	CL-ML, CL, MH	A-6, A-7	0	0	90-100	80-100	75-100	70-95	30-45	10-25
	11-25	silty clay, silty clay loam	CH, CL, CL-ML	A-6, A-7	0	0	90-100	80-100	75-100	60-95	35-60	15-35
	25-36	very gravelly loam	GM, SM, GP-GM, SP-SM	A-2, A-1	0	0-10	40-65	20-55	10-50	5-35	15-25	NP-5
	36-60	sand, gravel	GP, GW, SM, SP	A-1	0	0-10	40-65	20-55	10-40	1-20	---	NP
MlB:												
Miamian---------	0-11	silt loam	CL-ML, ML	A-4, A-6	0	0	95-100	95-100	90-100	75-95	25-40	4-12
	11-24	clay loam, clay	CL	A-6, A-7	0	0-3	85-100	80-100	75-95	70-85	35-50	15-30
	24-60	loam	CL, CL-ML, ML	A-6, A-4	0	0-3	75-95	75-90	65-85	50-75	20-35	3-13
MlC2:												
Miamian---------	0-7	silt loam	CL-ML, ML	A-6, A-4	0	0	95-100	95-100	90-100	75-95	25-40	4-12
	7-24	clay loam, clay	CL	A-7, A-6	0	0-3	85-100	80-100	75-95	70-85	35-50	15-30
	24-60	loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0-3	75-95	75-90	65-85	50-75	20-35	3-13
MlD2:												
Miamian---------	0-7	silt loam	CL-ML, ML	A-6, A-4	0	0	95-100	95-100	90-100	75-95	25-40	4-12
	7-24	clay loam, clay	CL	A-7, A-6	0	0-3	85-100	80-100	75-95	70-85	35-50	15-30
	24-60	loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0-3	75-95	75-90	65-85	50-75	20-35	3-13
MlF2:												
Miamian---------	0-5	silt loam	CL-ML, ML	A-6, A-4	0	0	95-100	95-100	90-100	75-95	25-40	4-12
	5-24	clay loam, clay	CL	A-7, A-6	0	0-3	85-100	80-100	75-95	70-85	35-50	15-30
	24-60	loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0-3	75-95	75-90	65-85	50-75	20-35	3-13
Mn:												
Montgomery------	0-9	silty clay loam	CL, CL-ML	A-7	0	0	100	100	100	85-100	40-50	20-30
	9-59	silty clay loam, silty clay, clay		A-7	0	0	100	100	95-100	90-100	50-65	30-42
	59-70	silty clay	CH	A-7	0	0	100	100	90-100	85-100	40-55	20-32
MrB:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30
MrB2:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	silty clay loam, clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30

TABLE 20.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
MrC:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	silty clay loam, clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30
MrC2:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	silty clay loam, clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30
MrD2:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	silty clay loam, clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30
MrE2:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	silty clay loam, clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30
MrF2:												
Morley----------	0-10	silty clay loam, silt loam	CL-ML, CL	A-4, A-6	0	0-5	95-100	95-100	90-100	75-95	25-40	5-15
	10-24	silty clay loam, clay	CH, CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-60	15-35
	24-60	silty clay loam	CL	A-6, A-7	0-1	0-10	95-100	90-100	85-95	80-90	30-50	15-30
Mu:												
Muskego---------	0-36	muck	PT	A-8	0	0	---	---	---	---	---	---
	36-60	coprogenous earth	OL	A-5	0	0	95-100	95-100	85-100	75-96	40-50	2-8
NpA:												
Nappanee--------	0-7	silt loam	CL	A-6	0	0-5	95-100	90-100	85-100	55-90	30-40	10-15
	7-25	silty clay loam, silty clay	CH	A-7	0	0-5	95-100	90-100	85-100	70-95	50-70	25-45
	25-60	silty clay	CH, CL	A-7	0	0-5	95-100	90-100	85-100	70-95	40-60	20-35
NpB:												
Nappanee--------	0-7	silt loam	CL	A-6	0	0-5	95-100	90-100	85-100	55-90	30-40	10-15
	7-25	silty clay loam, silty clay	CH	A-7	0	0-5	95-100	90-100	85-100	70-95	50-70	25-45
	25-60	silty clay	CH, CL	A-7	0	0-5	95-100	90-100	85-100	70-95	40-60	20-35
OdA:												
Odell-----------	0-10	silty clay loam, silt loam	CL-ML, ML	A-4, A-6	0	0	100	95-100	80-100	50-90	20-35	5-15
	10-18	silt loam, silty clay loam	CL	A-6, A-4	0	0	95-100	90-100	75-100	50-95	25-40	7-15
	18-60	loam	CL, CL-ML	A-4	0	0-3	95-100	85-100	70-95	50-75	15-30	4-10
Pa:												
Paulding--------	0-7	silty clay	CH, MH	A-7	0	0	100	100	95-100	90-100	50-80	20-46
	7-42	clay	CH, MH	A-7	0	0	100	100	95-100	90-100	60-86	20-46
	42-62	silty clay	CH, MH	A-7	0	0	100	100	95-100	90-100	60-86	20-46
Pm:												
Pewamo----------	0-6	silty clay loam	CH	A-7, A-6	0	0-5	90-100	75-100	75-100	70-90	35-50	15-25
	6-35	silty clay	CH, CL	A-7	0	0-5	95-100	75-100	75-100	75-95	40-55	20-35
	35-60	silty clay loam	CL	A-7	0	0-5	95-100	75-100	75-100	70-90	40-50	15-25

TABLE 20.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
Ro:												
Ross------------	0-25	silt loam	CL-ML, ML	A-4	0	0	95-100	95-100	90-100	75-95	20-35	NP-12
	25-38	silty clay loam	CL, CL-ML	A-6	0	0	95-100	95-100	90-100	80-95	22-45	3-20
	38-60	silty clay	CH, CL	A-6, A-7	0	0-5	95-100	95-100	90-100	85-100	15-30	NP-12
ScB:												
St. clair-------	0-8	silt loam, silty clay loam	CL-ML, CL	A-6, A-4	0	0-5	95-100	85-100	70-100	50-80	25-40	5-15
	8-28	clay, silty clay	CH, MH	A-7	0	0-5	95-100	85-100	75-100	65-95	50-70	20-40
	28-60	silty clay	CH	A-7	0	0-5	95-100	85-100	70-100	60-95	50-60	25-35
ScB2:												
St. clair-------	0-8	silt loam, silty clay loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	85-100	70-100	50-80	25-40	5-15
	8-28	clay, silty clay	CH, MH	A-7	0	0-5	95-100	85-100	75-100	65-95	50-70	20-40
	28-60	silty clay	CH	A-7	0	0-5	95-100	85-100	70-100	60-95	50-60	25-35
ScC:												
St. clair-------	0-8	silt loam, silty clay loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	85-100	70-100	50-80	25-40	5-15
	8-28	clay, silty clay	CH, MH	A-7	0	0-5	95-100	85-100	75-100	65-95	50-70	20-40
	28-60	silty clay	CH	A-7	0	0-5	95-100	85-100	70-100	60-95	50-60	25-35
ScC2:												
St. clair-------	0-8	silt loam, silty clay loam	CL, CL-ML	A-6, A-4	0	0-5	95-100	85-100	70-100	50-80	25-40	5-15
	8-28	clay, silty clay	CH, MH	A-7	0	0-5	95-100	85-100	75-100	65-95	50-70	20-40
	28-60	silty clay	CH	A-7	0	0-5	95-100	85-100	70-100	60-95	50-60	25-35
Sh:												
Shoals----------	0-14	silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	65-90	20-35	6-15
	14-38	silty clay loam	CL, CL-ML	A-6, A-4	0	0	100	100	90-100	75-85	25-40	5-15
	38-60	silty clay	CH, CL-ML	A-7	0	0	95-100	95-100	80-95	75-90	30-45	8-17
SlA:												
Sleeth----------	0-15	silt loam	CL-ML, ML, CL	A-4, A-6	0	0	100	90-100	75-95	50-85	20-35	3-15
	15-54	silty clay loam, silty clay	CL	A-6	0	0	85-95	85-95	80-90	65-75	30-40	15-25
	54-65	very gravelly sand	SP, GP, SP-SM, GP-GM	A-1	0	1-5	30-70	22-55	7-21	2-10	---	NP
So:												
Sloan-----------	0-17	silty clay loam	CL, ML	A-6, A-7, A-4	0	0	100	95-100	90-100	80-95	30-45	10-20
	17-25	silty clay loam loam, silt loam	CL, ML	A-6, A-7, A-4	0	0	100	90-100	85-100	75-95	30-45	8-18
	25-60	silty clay loam loam, silt loam	CL, ML	A-6, A-7, A-4	0	0	95-100	70-100	60-95	50-90	30-45	8-18
WaB:												
Warsaw----------	0-15	silt loam	CL-ML, CL	A-4, A-6	0	0	85-100	85-100	70-100	50-90	20-30	4-12
	15-26	silty clay loam, clay loam	SC, SC-SM, CL-ML, CL	A-4, A-6, A-2-6	0	0-3	90-100	85-100	60-90	30-70	20-35	6-15
	26-33	sandy clay loam	GC, SC-SM, SC, CL	A-4, A-6, A-2-6	0	0-5	70-90	60-85	55-70	30-60	20-35	6-15
	33-60	stratified gravel to sand, gravelly sandy loam	SP, GP, SP-SM, GP-GM	A-1	0	1-5	30-70	22-70	7-20	2-10	15-20	NP
Wc:												
Westland--------	0-14	silty clay loam	CL	A-6	0	0	100	100	75-100	55-90	30-40	11-16
	14-19	silty clay	CL, SC	A-6, A-4	0	0	85-100	85-100	50-100	40-80	25-40	8-16
	19-33	silty clay loam	SC, CL	A-6, A-4	0	0	85-100	85-100	50-100	40-80	25-40	8-16
	33-57	loam, gravelly loam	ML, CL, SC, SM	A-4, A-6	0	0-3	80-95	60-75	50-70	40-55	15-35	NP-15
	57-65	stratified sand to gravel	SP, SP-SM, GP, GP-GM	A-1	0	0-5	25-60	15-40	5-15	2-15	0-0	NP-3

TABLE 20.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage Passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
We:												
Wetzel----------	0-9	silty clay loam	CL	A-7, A-6	0	0	95-100	90-100	85-100	80-95	36-50	15-26
	9-32	silty clay loam, silty clay	CH, CL	A-7	0	0	90-100	85-100	80-100	80-100	40-60	18-34
	32-60	silty clay loam	CH, CL	A-6, A-7	0	0	90-100	85-100	80-100	80-100	36-60	15-32

TABLE 21.--PHYSICAL PROPERTIES OF THE SOILS

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not estimated. See text on page 121 for additional information.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Shrink- swell potential	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in	Pct				
Ag:										
Algiers----------	0-19	15-27	1.20-1.45	0.60-2.00	0.16-0.20	Low	.37	.37	5	6
	19-47	20-35	1.25-1.65	0.60-2.00	0.16-0.20	Low	.37	.37		
	47-60	20-35	1.25-1.65	0.20-2.00	0.15-0.24	Low	.37	.37		
BoA:										
Blount----------	0-6	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.28	.32	4	6
	6-22	35-48	1.40-1.70	0.06-0.60	0.12-0.19	Moderate	.28	.32		
	22-60	27-38	1.60-1.85	0.06-0.60	0.07-0.10	Moderate	.37	.43		
BoB:										
Blount----------	0-6	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.28	.32	4	6
	6-22	35-48	1.40-1.70	0.06-0.60	0.12-0.19	Moderate	.28	.32		
	22-60	27-38	1.60-1.85	0.06-0.60	0.07-0.10	Moderate	.37	.43		
BoB2:										
Blount----------	0-4	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.28	.32	4	6
	4-20	35-48	1.40-1.70	0.06-0.60	0.12-0.19	Moderate	.28	.32		
	20-60	27-38	1.60-1.85	0.06-0.60	0.07-0.10	Moderate	.37	.43		
Bs:										
Brookston-------	0-11	27-30	1.40-1.55	0.60-2.00	0.21-0.24	High	.28	.28	5	7
	11-34	25-35	1.40-1.60	0.60-2.00	0.15-0.19	Moderate	.28	.32		
	34-60	15-26	1.45-1.70	0.60-2.00	0.05-0.19	Low	.28	.32		
CeA:										
Celina----------	0-15	14-26	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	15-32	35-48	1.45-1.60	0.20-0.60	0.16-0.19	Moderate	.37	.37		
	32-60	16-27	1.60-1.82	0.20-0.60	0.06-0.10	Low	.37	.49		
CeB:										
Celina----------	0-13	14-26	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	13-32	35-48	1.45-1.60	0.20-0.60	0.16-0.19	Moderate	.37	.37		
	32-60	16-27	1.60-1.82	0.20-0.60	0.06-0.10	Low	.37	.49		
CrA:										
Crosby----------	0-7	11-24	1.35-1.45	0.60-2.00	0.20-0.24	Low	.43	.43	4	5
	7-25	35-45	1.50-1.60	0.06-0.20	0.15-0.20	Moderate	.43	.49		
	25-60	16-27	1.70-2.00	0.06-0.60	0.05-0.17	Low	.43	.49		
CrB:										
Crosby----------	0-7	11-24	1.35-1.45	0.60-2.00	0.20-0.24	Low	.43	.43	4	5
	7-25	35-45	1.50-1.60	0.06-0.20	0.15-0.20	Moderate	.43	.49		
	25-60	16-27	1.70-2.00	0.06-0.60	0.05-0.17	Low	.43	.49		
Ee:										
Eel-------------	0-18	18-27	1.30-1.60	0.60-2.00	0.20-0.24	Low	.32	.32	5	6
	18-40	20-32	1.40-1.60	0.60-2.00	0.17-0.22	Low	.43	.43		
	40-60	20-32	1.40-1.60	0.60-2.00	0.14-0.22	Low	.37	.43		
FoA:										
Fox-------------	0-9	10-17	1.35-1.55	0.60-2.00	0.20-0.22	Low	.37	---	4	5
	9-17	20-35	1.55-1.65	0.60-2.00	0.18-0.20	Moderate	.37	---		
	17-30	35-45	1.40-1.60	0.20-2.00	0.08-0.14	Moderate	.37	.49		
	30-34	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	34-60	2-8	1.30-1.70	6.00-20.00	0.02-0.07	Low	.10	---		

TABLE 21.--PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in	Pct				
FoB:										
Fox-------------	0-8	10-17	1.35-1.55	0.60-2.00	0.20-0.22	Low	.37	---	4	5
	8-16	20-35	1.55-1.65	0.60-2.00	0.18-0.20	Moderate	.37	---		
	16-29	35-45	1.40-1.60	0.20-2.00	0.08-0.14	Moderate	.37	.49		
	29-33	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	33-60	2-8	1.30-1.70	6.00-20.00	0.02-0.07	Low	.10	---		
FoB2:										
Fox-------------	0-7	10-17	1.35-1.55	0.60-2.00	0.20-0.22	Low	.37	---	4	5
	7-15	20-35	1.55-1.65	0.60-2.00	0.18-0.20	Moderate	.37	---		
	15-28	35-45	1.40-1.60	0.20-2.00	0.08-0.14	Moderate	.37	.49		
	28-32	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	32-60	2-8	1.30-1.70	6.00-20.00	0.02-0.07	Low	.10	---		
FoC2:										
Fox-------------	0-6	10-17	1.35-1.55	0.60-2.00	0.20-0.22	Low	.37	---	4	5
	6-14	20-35	1.55-1.65	0.60-2.00	0.18-0.20	Moderate	.37	---		
	14-27	35-45	1.40-1.60	0.20-2.00	0.08-0.14	Moderate	.37	.49		
	27-31	18-35	1.55-1.65	0.60-2.00	0.10-0.19	Low	.32	.32		
	31-60	2-8	1.30-1.70	6.00-20.00	0.02-0.07	Low	.10	---		
Gn:										
Genesee---------	0-13	18-27	1.30-1.50	0.20-2.00	0.20-0.24	Low	.32	.32	5	6
	13-44	18-27	1.30-1.60	0.20-2.00	0.17-0.22	Low	.32	.32		
	44-60	18-27	1.30-1.60	0.60-2.00	0.17-0.22	Low	.32	.32		
HeA:										
Henshaw---------	0-8	12-27	1.20-1.40	0.60-2.00	0.18-0.23	Low	.43	---	5	---
	8-44	27-35	1.20-1.40	0.20-0.60	0.15-0.19	Low	.43	---		
	44-60	27-34	1.20-1.40	0.20-2.00	0.17-0.22	Low	.43	---		
Ho:										
Homer-----------	0-9	10-17	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	5
	9-34	27-42	1.30-1.50	0.20-2.00	0.08-0.17	Moderate	.37	.43		
	34-60	1-10	1.65-1.95	6.00-19.99	0.01-0.04	Low	.10	.37		
Ka:										
Kane------------	0-13	18-22	1.35-1.55	0.60-2.00	0.20-0.24	Low	.28	.28	4	5
	13-31	25-45	1.35-1.55	0.60-2.00	0.15-0.20	Moderate	.28	.28		
	31-39	20-30	1.40-1.60	0.60-6.00	0.12-0.18	Low	.28	.28		
	39-60	1-10	1.90-2.20	6.00-12.00	0.02-0.04	Low	.10	---		
KeA:										
Kendallville----	0-9	8-24	1.30-1.50	0.60-2.00	0.18-0.24	Low	.37	.43	5	6
	9-20	20-30	1.40-1.60	0.60-2.00	0.14-0.17	Low	.37	.37		
	20-29	35-42	1.40-1.65	0.20-2.00	0.08-0.14	Moderate	.37	.55		
	29-60	12-30	1.45-1.75	0.20-0.60	0.11-0.15	Low	.37	.43		
KeB:										
Kendallville----	0-9	8-24	1.30-1.50	0.60-2.00	0.18-0.24	Low	.37	.43	5	6
	9-20	20-30	1.40-1.60	0.60-2.00	0.14-0.17	Low	.37	.37		
	20-29	35-42	1.40-1.65	0.20-2.00	0.08-0.14	Moderate	.37	.55		
	29-60	12-30	1.45-1.75	0.20-0.60	0.11-0.15	Low	.37	.43		
Lc:										
Lippincott------	0-11	27-36	1.35-1.50	0.60-2.00	0.17-0.23	Moderate	.28	.32	4	7
	11-25	35-50	1.45-1.60	0.60-2.00	0.13-0.17	Moderate	.28	.32		
	25-36	5-15	1.50-1.75	6.00-20.00	0.04-0.10	Low	.10	.37		
	36-60	2-10	1.50-1.75	6.00-20.00	0.02-0.04	Low	.10	.37		

TABLE 21.--PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in	Pct				
MlB:										
Miamian----------	0-11	14-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	11-24	35-48	1.45-1.70	0.20-0.60	0.12-0.17	Moderate	.37	.43		
	24-60	16-27	1.60-1.85	0.20-0.60	0.06-0.10	Low	.37	.43		
MlC2:										
Miamian----------	0-7	14-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	7-24	35-48	1.45-1.70	0.20-0.60	0.12-0.17	Moderate	.37	.43		
	24-60	16-27	1.60-1.85	0.20-0.60	0.06-0.10	Low	.37	.43		
MlD2:										
Miamian----------	0-7	14-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	7-24	35-48	1.45-1.70	0.20-0.60	0.12-0.17	Moderate	.37	.43		
	24-60	16-27	1.60-1.85	0.20-0.60	0.06-0.10	Low	.37	.43		
MlF2:										
Miamian----------	0-5	14-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	5-24	35-48	1.45-1.70	0.20-0.60	0.12-0.17	Moderate	.37	.43		
	24-60	16-27	1.60-1.85	0.20-0.60	0.06-0.10	Low	.37	.43		
Mn:										
Montgomery-------	0-9	35-40	1.35-1.55	0.20-0.60	0.20-0.23	High	.28	.28	5	4
	9-59	3955	1.45-1.65	0.06-0.20	0.11-0.18	High	.37	.37		
	59-70	35-48	1.50-1.60	0.06-0.20	0.18-0.20	Moderate	.37	.37		
MrB:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
MrB2:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
MrC:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
MrC2:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
MrD2:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
MrE2:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
MrF2:										
Morley-----------	0-10	22-27	1.35-1.55	0.60-2.00	0.20-0.24	Low	.37	.37	4	6
	10-24	40-50	1.55-1.70	0.06-0.60	0.11-0.15	Moderate	.43	.43		
	24-60	27-40	1.60-1.80	0.06-0.60	0.07-0.12	Moderate	.43	.43		
Mu:										
Muskego----------	0-36	2-4	0.10-0.21	0.60-6.00	0.35-0.45	---	.10	.10	1	2
	36-60	18-35	0.30-1.10	0.06-0.20	0.18-0.24	Moderate	.28	.28		

TABLE 21.--PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Shrink- swell potential	Erosion factors Kw	Kf	T	Wind erodi- bility group
	In	Pct	g/cc	In/hr	In/in	Pct				
NpA:										
Nappanee--------	0-7	20-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	3	6
	7-25	37-60	1.40-1.65	0.06-0.20	0.08-0.14	Moderate	.37	.37		
	25-60	35-50	1.50-1.75	0.06-0.20	0.06-0.12	Moderate	.37	.37		
NpB:										
Nappanee--------	0-7	20-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.37	.37	3	6
	7-25	37-60	1.40-1.65	0.06-0.20	0.08-0.14	Moderate	.37	.37		
	25-60	35-50	1.50-1.75	0.06-0.20	0.06-0.12	Moderate	.37	.37		
OdA:										
Odell-----------	0-10	18-27	1.30-1.50	0.60-2.00	0.20-0.24	Low	.28	.28	5	6
	10-18	25-35	1.50-1.70	0.60-2.00	0.15-0.19	Moderate	.28	.28		
	18-60	12-25	1.55-1.70	0.20-0.60	0.08-0.15	Low	.37	.43		
Pa:										
Paulding--------	0-7	40-65	1.20-1.40	0.20-0.60	0.11-0.14	High	.28	.28	5	4
	7-42	60-80	1.35-1.50	0.02-0.06	0.08-0.11	High	.28	.28		
	42-62	60-75	1.40-1.55	0.02-0.06	0.04-0.06	High	.28	.28		
Pm:										
Pewamo----------	0-6	27-40	1.35-1.55	0.60-2.00	0.20-0.23	Moderate	.28	.28	5	7
	6-35	40-50	1.40-1.70	0.20-0.60	0.12-0.20	Moderate	.32	.32		
	35-60	30-40	1.50-1.70	0.20-0.60	0.14-0.18	Moderate	.37	.37		
Ro:										
Ross------------	0-25	15-27	1.20-1.45	0.60-2.00	0.18-0.24	Moderate	.32	.32	5	5
	25-38	18-32	1.20-1.50	0.60-2.00	0.18-0.22	Moderate	.32	.32		
	38-60	35-42	1.35-1.60	0.20-0.60	0.15-0.18	High	.32	.32		
ScB:										
St. Clair-------	0-8	20-27	1.50-1.65	0.60-2.00	0.20-0.24	Low	.37	.37	3	6
	8-28	40-60	1.35-1.70	0.06-0.20	0.10-0.12	High	.37	.37		
	28-60	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	.37	.37		
ScB2:										
St. Clair-------	0-8	20-27	1.50-1.65	0.60-2.00	0.20-0.24	Low	.37	.37	3	6
	8-28	40-60	1.35-1.70	0.06-0.20	0.10-0.12	High	.37	.37		
	28-60	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	.37	.37		
ScC:										
St. Clair-------	0-8	20-27	1.50-1.65	0.60-2.00	0.20-0.24	Low	.37	.37	3	6
	8-28	40-60	1.35-1.70	0.06-0.20	0.10-0.12	High	.37	.37		
	28-60	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	.37	.37		
ScC2:										
St. Clair-------	0-8	20-27	1.50-1.65	0.60-2.00	0.20-0.24	Low	.37	.37	3	6
	8-28	40-60	1.35-1.70	0.06-0.20	0.10-0.12	High	.37	.37		
	28-60	35-55	1.60-1.75	0.06-0.20	0.09-0.11	High	.37	.37		
Sh:										
Shoals----------	0-14	18-27	1.30-1.50	0.60-2.00	0.22-0.24	Low	.37	.37	5	6
	14-38	18-33	1.35-1.55	0.60-2.00	0.17-0.22	Moderate	.37	.37		
	38-60	35-42	1.50-1.65	0.60-2.00	0.14-0.18	High	.37	.37		
SlA:										
Sleeth----------	0-15	11-22	1.30-1.45	0.60-2.00	0.20-0.24	Low	.32	.32	4	5
	15-54	20-35	1.45-1.60	0.60-2.00	0.15-0.19	Moderate	.32	.37		
	54-65	2-5	1.60-1.80	6.00-20.00	0.02-0.04	Low	.10	.37		

TABLE 21.--PHYSICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Shrink-swell potential	Erosion factors Kw	Kf	T	Wind erodi-bility group
	In	Pct	g/cc	In/hr	In/in	Pct				
So:										
Sloan-----------	0-17	27-33	1.25-1.50	0.60-2.00	0.20-0.23	Moderate	.28	.28	5	7
	17-25	22-35	1.25-1.55	0.20-2.00	0.15-0.19	Moderate	.37	.37		
	25-60	22-35	1.25-1.55	0.20-2.00	0.13-0.18	Moderate	.37	.37		
WaB:										
Warsaw----------	0-15	15-25	1.30-1.50	0.60-2.00	0.20-0.24	Low	.28	.28	4	---
	15-26	27-35	1.35-1.60	0.60-2.00	0.16-0.19	Low	.28	.32		
	26-33	20-30	1.40-1.65	0.60-2.00	0.13-0.16	Low	.28	.43		
	33-60	2-8	1.40-1.65	6.00-20.00	0.02-0.04	Low	.10	.37		
Wc:										
Westland--------	0-14	27-29	1.45-1.55	0.60-2.00	0.17-0.23	Moderate	.28	.28	5	7
	14-19	35-45	1.40-1.65	0.60-2.00	0.15-0.20	Moderate	.28	.32		
	19-33	27-39	1.40-1.65	0.60-2.00	0.15-0.20	Moderate	.28	.32		
	33-57	5-30	1.55-1.70	0.60-2.00	0.04-0.13	Low	.28	.37		
	57-65	1-10	1.65-1.95	6.00-20.00	0.01-0.04	Low	.10	.24		
We:										
Wetzel----------	0-9	32-40	1.35-1.50	0.20-0.60	0.20-0.23	Moderate	.37	.37	5	7
	9-32	35-55	1.45-1.75	0.06-0.60	0.12-0.16	Moderate	.37	.37		
	32-60	35-45	1.65-1.85	0.06-0.60	0.06-0.10	Moderate	.37	.37		

TABLE 22.--CHEMICAL PROPERTIES OF THE SOILS

(Absence of an entry indicates that data were not estimated. See text on page 123 for additional information.)

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
Ag:					
Algiers----------	0-19	6.1-7.3	2.0-4.0	10-20	---
	19-47	6.1-8.4	0.5-1.0	10-22	0-5
	47-60	7.9-8.4	0.5-1.0	---	0-10
BoA:					
Blount----------	0-6	4.5-7.3	2.0-3.0	17-22	---
	6-22	4.5-6.5	0.0-1.0	21-30	---
	22-60	7.4-8.4	0.0-0.5	16-25	5-30
BoB:					
Blount----------	0-6	4.5-7.3	2.0-3.0	17-22	---
	6-22	4.5-6.5	0.0-1.0	21-30	---
	22-60	7.4-8.4	0.0-0.5	16-25	5-30
BoB2:					
Blount----------	0-4	4.5-7.3	2.0-3.0	17-22	---
	4-20	4.5-6.5	0.0-1.0	21-30	---
	20-60	7.4-8.4	0.0-0.5	16-25	5-30
Bs:					
Brookston--------	0-11	6.1-7.3	4.0-8.0	16-28	---
	11-34	6.1-7.8	0.5-2.0	11-25	---
	34-60	7.4-8.4	0.1-1.0	6.0-18	5-35
CeA:					
Celina----------	0-15	5.6-7.3	1.0-3.0	8.0-21	---
	15-32	4.5-7.8	---	---	---
	32-60	7.4-8.4	---	---	10-50
CeB:					
Celina----------	0-13	5.6-7.3	1.0-3.0	8.0-21	---
	13-32	4.5-7.8	---	---	---
	32-60	7.4-8.4	---	---	10-50
CrA:					
Crosby----------	0-7	5.1-6.5	1.0-3.0	6.0-21	---
	7-25	5.1-6.3	0.0-0.5	5.0-18	---
	25-60	7.4-8.4	---	6.0-17	10-40
CrB:					
Crosby----------	0-7	5.1-6.5	1.0-3.0	6.0-21	---
	7-25	5.1-6.3	0.0-0.5	5.0-18	---
	25-60	7.4-8.4	---	6.0-17	10-40

TABLE 22.--CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
Ee:					
Eel	0-18	6.1-7.8	3.0-6.0	12-20	---
	18-40	6.1-7.8	1.0-2.0	12-20	---
	40-60	6.1-7.8	1.0-2.0	8.0-18	5-35
FoA:					
Fox	0-9	5.6-7.3	1.0-3.0	8.0-18	---
	9-17	5.1-6.5	---	---	---
	17-30	5.1-6.5	---	---	---
	30-34	6.6-8.4	---	---	---
	34-60	7.4-8.4	---	---	5-50
FoB:					
Fox	0-8	5.6-7.3	1.0-3.0	8.0-18	---
	8-16	5.1-6.5	---	---	---
	16-29	5.1-6.5	---	---	---
	29-33	6.6-8.4	---	---	---
	33-60	7.4-8.4	---	---	5-50
FoB2:					
Fox	0-7	5.6-7.3	1.0-3.0	8.0-18	---
	7-15	5.1-6.5	---	---	---
	15-28	5.1-6.5	---	---	---
	28-32	6.6-8.4	---	---	---
	32-60	7.4-8.4	---	---	5-50
FoC2:					
Fox	0-6	5.6-7.3	1.0-3.0	8.0-18	---
	6-14	5.1-6.5	---	---	---
	14-27	5.1-6.5	---	---	---
	27-31	6.6-8.4	---	---	---
	31-60	7.4-8.4	---	---	5-50
Gn:					
Genesee	0-13	6.6-7.8	1.0-3.0	9.0-21	---
	13-44	6.6-8.4	0.5-1.0	8.0-19	---
	44-60	7.4-8.4	0.2-1.0	5.0-14	0-30
HeA:					
Henshaw	0-8	5.6-7.8	0.5-2.0	6.0-14	---
	8-44	5.1-7.8	0.5-1.0	6.0-14	---
	44-60	6.6-8.4	0.5-0.5	10-30	0-30
Ho:					
Homer	0-9	5.1-7.3	1.0-3.0	6.0-17	---
	9-34	5.1-7.8	0.0-0.5	8.0-22	---
	34-60	7.9-8.4	---	0.0-6.0	5-25

TABLE 22.--CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
Ka:					
Kane------------	0-13	5.6-7.3	3.0-5.0	17-22	---
	13-31	6.1-7.3	0.5-1.0	15-23	---
	31-39	6.1-7.8	0.0-0.5	12-19	0-15
	39-60	7.9-8.4	0.0-0.2	0.0-6.0	15-40
KeA:					
Kendallville----	0-9	5.6-7.3	1.0-3.0	10-20	---
	9-20	4.5-6.0	---	---	---
	20-29	4.5-7.8	---	---	---
	29-60	6.6-8.4	---	---	25-40
KeB:					
Kendallville----	0-9	5.6-7.3	1.0-3.0	10-20	---
	9-20	4.5-6.0	---	---	---
	20-29	4.5-7.8	---	---	---
	29-60	6.6-8.4	---	---	25-40
Lc:					
Lippincott------	0-11	6.1-7.3	4.0-8.0	15-30	---
	11-25	6.1-7.8	---	---	---
	25-36	7.4-8.4	---	---	---
	36-60	7.4-8.4	---	---	5-15
MlB:					
Miamian---------	0-11	5.6-7.3	0.5-3.0	8.0-18	---
	11-24	5.1-7.8	0.0-0.2	10-21	---
	24-60	7.4-8.4	---	6.0-15	25-40
MlC2:					
Miamian---------	0-7	5.6-7.3	0.5-3.0	8.0-18	---
	7-24	5.1-7.8	0.0-0.2	10-21	---
	24-60	7.4-8.4	---	6.0-15	25-40
MlD2:					
Miamian---------	0-7	5.6-7.3	0.5-3.0	8.0-18	---
	7-24	5.1-7.8	0.0-0.2	10-21	---
	24-60	7.4-8.4	---	6.0-15	25-40
MlF2:					
Miamian---------	0-5	5.6-7.3	0.5-3.0	8.0-18	---
	5-24	5.1-7.8	0.0-0.2	10-21	---
	24-60	7.4-8.4	---	6.0-15	25-40
Mn:					
Montgomery------	0-9	6.1-7.8	3.0-6.0	20-36	0
	9-59	6.1-7.8	0.0-1.0	16-35	0
	59-70	7.4-8.4	0.0-0.5	14-30	5-15

TABLE 22.--CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
MrB:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
MrB2:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
MrC:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
MrC2:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
MrD2:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
MrE2:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
MrF2:					
Morley----------	0-10	5.6-7.3	1.0-3.0	13-20	---
	10-24	5.1-7.3	0.2-0.5	21-30	0-10
	24-60	7.4-8.4	0.2-0.5	16-24	0-20
Mu:					
Muskego---------	0-36	5.6-7.3	60-90	140-180	---
	36-60	6.6-8.4	6.0-20	10-45	60-80
NpA:					
Nappanee--------	0-7	5.1-7.3	1.0-3.0	10-15	---
	7-25	5.1-7.8	---	8.0-17	---
	25-60	7.4-8.4	---	5.0-12	10-20
NpB:					
Nappanee--------	0-7	5.1-7.3	1.0-3.0	10-15	---
	7-25	5.1-7.8	---	8.0-17	---
	25-60	7.4-8.4	---	5.0-12	10-20

TABLE 22.--CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
OdA:					
Odell-----------	0-10	5.6-7.3	2.0-4.0	11-25	---
	10-18	5.6-7.3	0.2-1.0	10-23	---
	18-60	6.6-8.4	0.0-1.0	4.0-17	0-10
Pa:					
Paulding--------	0-7	5.6-7.3	3.0-5.0	24-34	---
	7-42	5.6-7.8	---	---	---
	42-62	7.4-8.4	---	---	10-30
Pm:					
Pewamo----------	0-6	6.1-7.3	4.0-8.0	10-40	---
	6-35	5.6-7.8	---	10-20	---
	35-60	7.4-8.4	---	5.0-15	15-30
Qu:					
Quarries--------	---	---	---	---	---
Ro:					
Ross------------	0-25	6.6-8.4	3.0-5.0	12-26	---
	25-38	6.6-7.8	---	---	---
	38-60	6.6-7.8	---	---	---
ScB:					
St. Clair-------	0-8	4.5-7.3	1.0-3.0	5.0-25	---
	8-28	4.5-7.8	---	5.0-20	---
	28-60	7.4-8.4	---	5.0-20	20-30
ScB2:					
St. Clair-------	0-8	4.5-7.3	1.0-3.0	5.0-25	---
	8-28	4.5-7.8	---	5.0-20	---
	28-60	7.4-8.4	---	5.0-20	20-30
ScC:					
St. Clair-------	0-8	4.5-7.3	1.0-3.0	5.0-25	---
	8-28	4.5-7.8	---	5.0-20	---
	28-60	7.4-8.4	---	5.0-20	20-30
ScC2:					
St. Clair-------	0-8	4.5-7.3	1.0-3.0	5.0-25	---
	8-28	4.5-7.8	---	5.0-20	---
	28-60	7.4-8.4	---	5.0-20	20-30
Sh:					
Shoals----------	0-14	6.1-7.8	2.0-5.0	12-27	0-5
	14-38	6.1-7.8	0.5-2.0	8.0-24	0-10
	38-60	6.1-8.4	0.5-1.0	---	0-25

TABLE 22.--CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Soil reaction	Organic matter	Cation-exchange capacity	Calcium carbonate
	In	pH	Pct	meq/100 g	Pct
SlA:					
Sleeth----------	0-15	6.6-7.3	0.5-3.0	5.0-20	---
	15-54	4.5-6.5	0.0-0.5	8.0-23	---
	54-65	7.9-8.4	0.0-0.5	1.0-5.0	10-30
So:					
Sloan-----------	0-17	6.1-7.8	3.0-6.0	19-29	---
	17-25	6.1-8.4	0.5-1.0	10-20	0-20
	25-60	6.6-8.4	0.0-0.5	10-20	5-40
W:					
Water-----------	---	---	---	---	---
WaB:					
Warsaw----------	0-15	5.6-7.3	2.0-5.0	10-25	---
	15-26	5.1-6.5	0.5-2.0	7.0-22	---
	26-33	5.1-8.4	0.5-2.0	9.0-22	0-10
	33-60	7.9-8.4	0.0-1.0	1.0-7.0	15-25
Wc:					
Westland--------	0-14	6.1-7.3	2.0-6.0	15-30	---
	14-19	6.1-7.3	0.5-2.0	9.0-25	---
	19-33	6.1-7.8	0.5-2.0	9.0-25	---
	33-57	6.6-7.8	0.5-1.0	3.0-22	0-10
	57-65	7.4-8.4	0.2-1.0	1.0-9.0	5-35
We:					
Wetzel----------	0-9	6.1-7.3	3.0-5.0	15-30	---
	9-32	6.1-8.4	---	---	---
	32-60	7.4-8.4	---	---	15-30

TABLE 23.--WATER FEATURES

(Depths of layers are in feet. See text on page 124 for definitions of terms used in this table. A dash indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
Ag:										
Algiers	C/D	January	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		February	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		March	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		April	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		May	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		June	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		November	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		December	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
BoA:										
Blount	C	January	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		February	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		March	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		April	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		May	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
BoB:										
Blount	C	January	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		February	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		March	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		April	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		May	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
BoB2:										
Blount	C	January	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		February	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		March	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		April	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
		May	0.5-1.5	2.5-4.0	Perched	---	---	---	---	---
Bs:										
Brookston	B/D	January	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
CeA:										
Celina	C	January	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		February	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
CeB:										
Celina	C	January	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		February	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
CrA:										
Crosby	C	January	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
		February	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
		March	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
		April	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
CrB:										
Crosby	C	January	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
		February	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
		March	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---
		April	0.5-1.5	1.5-2.5	Perched	---	---	---	---	---

TABLE 23.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
Ee:										
Eel	C	January	1.0-3.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		February	1.0-3.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		March	1.0-3.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		April	1.0-3.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		May	---	---	---	---	---	---	Brief	Occasional.
		June	---	---	---	---	---	---	Brief	Occasional.
		November	---	---	---	---	---	---	Brief	Occasional.
		December	---	---	---	---	---	---	Brief	Occasional.
FoA:										
Fox	B	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
FoB:										
Fox	B	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
FoB2:										
Fox	B	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
FoC2:										
Fox	B	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---

TABLE 23.--WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
Gn:										
Genesee	B	January	>3.0	---	---	---	---	---	Brief	Occasional.
		February	>3.0	---	---	---	---	---	Brief	Occasional.
		March	>3.0	---	---	---	---	---	Brief	Occasional.
		April	>3.0	---	---	---	---	---	Brief	Occasional.
		May	>3.0	---	---	---	---	---	Brief	Occasional.
		June	>3.0	---	---	---	---	---	Brief	Occasional.
		November	>3.0	---	---	---	---	---	Brief	Occasional.
		December	>3.0	---	---	---	---	---	Brief	Occasional.
HeA:										
Henshaw	C	January	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		February	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		March	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		November	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		December	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
Ho:										
Homer	B	January	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		February	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		March	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		April	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
Ka:										
Kane	B	February	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		March	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		April	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		May	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
		June	0.5-1.5	> 6.0	Apparent	---	---	---	---	---
KeA:										
Kendallville	B	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
KeB:										
Kendallville	B	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
Lc:										
Lippincott	B/D	January	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---

TABLE 23.--WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table			Ponding			Flooding	
			Upper limit	Lower limit	Kind	Surface water depth	Duration	Frequency	Duration	Frequency
MlB:										
Miamian---------	C	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
MlC2:										
Miamian---------	C	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
MlD2:										
Miamian---------	C	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
MlF2:										
Miamian---------	C	January	>4.0	---	---	---	---	---	---	---
		February	>4.0	---	---	---	---	---	---	---
		March	>4.0	---	---	---	---	---	---	---
		April	>4.0	---	---	---	---	---	---	---
		May	>4.0	---	---	---	---	---	---	---
		June	>4.0	---	---	---	---	---	---	---
		July	>4.0	---	---	---	---	---	---	---
		August	>4.0	---	---	---	---	---	---	---
		September	>4.0	---	---	---	---	---	---	---
		October	>4.0	---	---	---	---	---	---	---
		November	>4.0	---	---	---	---	---	---	---
		December	>4.0	---	---	---	---	---	---	---
Mn:										
Montgomery------	D	January	0.0-0.5	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-1.0	Long	---	---	---
MrB:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---

TABLE 23.--WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
MrB2:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
MrC:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
MrC2:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
MrD2:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
MrE2:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
MrF2:										
Morley----------	C	March	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.0-2.0	2.0-3.0	Perched	---	---	---	---	---
Mu:										
Muskego---------	A/D	January	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		February	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		March	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		April	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		May	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		June	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		July	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		August	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		September	0.0	> 6.0	Apparent	---	---	---	---	---
		October	0.0	> 6.0	Apparent	---	---	---	---	---
		November	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
		December	0.0	> 6.0	Apparent	0.0-1.0	Long	---	---	---
NpA:										
Nappanee--------	D	January	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		February	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		March	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		April	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		May	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		November	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		December	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
NpB:										
Nappanee--------	D	January	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		February	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		March	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		April	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		May	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		November	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		December	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
OdA:										
Odell-----------	B	January	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		February	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		March	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---
		April	0.5-1.0	2.0-3.0	Perched	---	---	---	---	---

TABLE 23.--WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
Pa:										
Paulding	D	January	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
Pm:										
Pewamo	C/D	January	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
Ro:										
Ross	B	January	>3.0	---	---	---	---	---	Brief	Occasional.
		February	>3.0	---	---	---	---	---	Brief	Occasional.
		March	>3.0	---	---	---	---	---	Brief	Occasional.
		April	>3.0	---	---	---	---	---	Brief	Occasional.
		May	>3.0	---	---	---	---	---	Brief	Occasional.
		June	>3.0	---	---	---	---	---	Brief	Occasional.
		November	>3.0	---	---	---	---	---	Brief	Occasional.
		December	>3.0	---	---	---	---	---	Brief	Occasional.
ScB:										
St. Clair	D	March	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
ScB2:										
St. Clair	D	March	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
ScC:										
St. Clair	D	March	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
ScC2:										
St. Clair	D	March	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		April	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
		May	1.5-2.0	2.0-3.0	Perched	---	---	---	---	---
Sh:										
Shoals	C	January	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		February	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		March	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		April	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		May	---	---	---	---	---	---	Brief	Occasional.
		June	---	---	---	---	---	---	Brief	Occasional.
		November	---	---	---	---	---	---	Brief	Occasional.
		December	---	---	---	---	---	---	Brief	Occasional.
SlA:										
Sleeth	C	January	0.5-1.0	> 6.0	Apparent	---	---	---	---	---
		February	0.5-1.0	> 6.0	Apparent	---	---	---	---	---
		March	0.5-1.0	> 6.0	Apparent	---	---	---	---	---
		April	0.5-1.0	> 6.0	Apparent	---	---	---	---	---
So:										
Sloan	B/D	January	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent.
		February	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent.
		March	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent.
		April	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent.
		May	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Frequent.
		June	0.0-1.0	> 6.0	Apparent	---	---	---	Brief	Occasional.
		November	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent.
		December	0.0-1.0	> 6.0	Apparent	---	---	---	Long	Frequent.

TABLE 23.--WATER FEATURES--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Water table: Kind	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
WaB:										
Warsaw----------	B	January	>3.0	---	---	---	---	---	---	---
		February	>3.0	---	---	---	---	---	---	---
		March	>3.0	---	---	---	---	---	---	---
		April	>3.0	---	---	---	---	---	---	---
		May	>3.0	---	---	---	---	---	---	---
		June	>3.0	---	---	---	---	---	---	---
		July	>3.0	---	---	---	---	---	---	---
		August	>3.0	---	---	---	---	---	---	---
		September	>3.0	---	---	---	---	---	---	---
		October	>3.0	---	---	---	---	---	---	---
		November	>3.0	---	---	---	---	---	---	---
		December	>3.0	---	---	---	---	---	---	---
Wc:										
Westland--------	B/D	January	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-0.5	Brief	---	---	---
We:										
Wetzel----------	D	January	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		February	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		March	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		April	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		May	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---
		December	0.0-0.5	> 6.0	Apparent	0.0-1.0	Brief	---	---	---

TABLE 24.--SOIL FEATURES

(See text on page 125 for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	In		In	In			
Ag: Algiers	---	---	---	---	---	---	High	High	Low
BoA: Blount	Dense material	20-40	---	Weakly cemented	---	---	High	High	High
BoB: Blount	Dense material	20-40	---	Weakly cemented	---	---	High	High	High
BoB2: Blount	Dense material	20-40	---	Weakly cemented	---	---	High	High	High
Bs: Brookston	---	---	---	---	---	---	High	High	Low
CeA: Celina	Dense material	20-40	---	Very weakly cemented	---	---	High	High	Moderate
CeB: Celina	Dense material	20-40	---	Very weakly cemented	---	---	High	High	Moderate
CrA: Crosby	Dense material	20-40	---	Very weakly cemented	---	---	High	High	High
CrB: Crosby	Dense material	20-40	---	Very weakly cemented	---	---	High	High	High
Ee: Eel	---	---	---	---	---	---	High	Moderate	Low
FoA: Fox	Strongly contrasting textural stratification	24-42	---	---	---	---	Moderate	Moderate	Moderate
FoB: Fox	Strongly contrasting textural stratification	24-42	---	---	---	---	Moderate	Moderate	Moderate
FoB2: Fox	Strongly contrasting textural stratification	24-42	---	---	---	---	Moderate	Moderate	Moderate
FoC2: Fox	Strongly contrasting textural stratification	24-42	---	---	---	---	Moderate	Moderate	Moderate
Gn: Genesee	---	---	---	---	---	---	Moderate	Moderate	Low
HeA: Henshaw	---	---	---	---	---	---	High	High	Low
Ho: Homer	Strongly contrasting textural stratification	36-40	---	---	---	---	High	High	Moderate
Ka: Kane	Strongly contrasting textural stratification	35-40	---	---	---	---	High	High	Moderate
KeA: Kendallville	Dense material	20-40	---	Very weakly cemented	---	---	Moderate	High	Moderate

Table 24.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Subsidence: Initial	Subsidence: Total	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In		In	In			
KeB:									
Kendallville	Dense material	20-40	---	Very weakly cemented	---	---	Moderate	High	Moderate
Lc:									
Lippincott	Stongly contrasting textural stratification	24-36	---	---	---	---	Moderate	High	Low
MlB:									
Miamian	Dense material	20-40	---	Extremely weakly cemented	---	---	Moderate	High	Moderate
MlC2:									
Miamian	Dense material	20-40	---	Extremely weakly cemented	---	---	Moderate	High	Moderate
MlD2:									
Miamian	Dense material	20-40	---	Extremely weakly cemented	---	---	Moderate	High	Moderate
MlF2:									
Miamian	Dense material	20-40	---	Extremely weakly cemented	---	---	Moderate	High	Moderate
Mn:									
Montgomery	---	---	---	---	---	---	High	High	Low
MrB:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
MrB2:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
MrC:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
MrC2:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
MrD2:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
MrE2:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
MrF2:									
Morley	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Moderate
Mu:									
Muskego	---	---	---	---	---	35-45	High	High	Low
NpA:									
Nappanee	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Low
NpB:									
Nappanee	Dense material	20-40	---	Weakly cemented	---	---	Moderate	High	Low
OdA:									
Odell	Dense material	20-40	---	Very weakly cemented	---	---	High	High	Moderate
Pa:									
Paulding	Dense material	20-40	---	Strongly cemented	---	---	Moderate	High	Low
Pm:									
Pewamo	---	---	---	---	---	---	High	High	Low
Ro:									
Ross	---	---	---	---	---	---	Moderate	Moderate	Low
ScB:									
St. Clair	Dense material	20-40	---	Very weakly cemented	---	---	Moderate	High	Moderate
ScB2:									
St. Clair	Dense material	20-40	---	Very weakly cemented	---	---	Moderate	High	Moderate

Table 24.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	In		In	In			
ScC:									
St. Clair	Dense material	20-40	---	Very weakly cemented	---	---	Moderate	High	Moderate
ScC2:									
St. Clair	Dense material	20-40	---	Very weakly cemented	---	---	Moderate	High	Moderate
Sh:									
Shoals	---	---	---	---	---	---	High	High	Low
SlA:									
Sleeth	---	---	---	---	---	---	High	High	Low
So:									
Sloan	---	---	---	---	---	---	High	High	Low
WaB:									
Warsaw	Strongly contrasting textural stratification	30-40	---	---	---	---	Moderate	Moderate	Moderate
Wc:									
Westland	---	---	---	---	---	---	High	High	Low
We:									
Wetzel	---	---	---	---	---	---	High	High	Low

TABLE 25.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text in the Soil Series and Their Morphology section starting on page 127 for a description of those characteristics that are outside the range of the series)

Soil name	Family or higher taxonomic class
Algiers	Fine-loamy, mixed, nonacid, mesic Aquic Udifluvents
Blount	Fine, illitic, mesic Aeric Ochraqualfs
Brookston	Fine-loamy, mixed, mesic Typic Argiaquolls
Celina	Fine, mixed, mesic Aquic Hapludalfs
Crosby	Fine, mixed, mesic Aeric Ochraqualfs
Eel	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
*Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
*Genesee	Fine-loamy, mixed, nonacid, mesic Fluventic Eutrochrepts
*Henshaw	Fine-silty, mixed, mesic Aquic Hapludalfs
*Homer	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aeric Ochraqualfs
Kane	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Argiudolls
Kendallville	Fine-loamy, mixed, mesic Typic Hapludalfs
Lippincott	Clayey over sandy or sandy-skeletal, mixed, mesic Typic Argiaquolls
Miamian	Fine, mixed, mesic Typic Hapludalfs
*Montgomery	Fine, mixed, mesic Typic Haplaquolls
*Morley	Fine, illitic, mesic Typic Hapludalfs
Muskego	Coprogenous, euic, mesic Limnic Medisaprists
Nappanee	Fine, illitic, mesic Aeric Ochraqualfs
Odell	Fine-loamy, mixed, mesic Aquic Argiudolls
Paulding	Very-fine, illitic, nonacid, mesic Typic Haplaquepts
Pewamo	Fine, mixed, mesic Typic Argiaquolls
*Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Shoals	Fine-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Sleeth	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Sloan	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
St. Clair	Fine, illitic, mesic Typic Hapludalfs
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
*Westland	Fine-loamy, mixed, mesic Typic Argiaquolls
Wetzel	Fine, illitic, mesic Typic Ochraqualfs

TABLE 26.--INTERPRETIVE GROUPS

(Dashes indicates that the soil was not assigned to the interpretive group. See text of pages 97, 89, and 91 for additional information on land capability units, prime farmland, and hydric soils, respectively.)

Map symbol and soil name	Land capability units	Prime farmland	Hydric
Ag:	2w-2	Prime farmland if drained	
Algiers			No
BoA:	2w-5	Prime farmland if drained	
Blount			No
BoB:	2e-4	Prime farmland if drained	
Blount			No
BoB2:	2e-4	Prime farmland if drained	
Blount			No
Bs:	2w-6	Prime farmland if drained	
Brookston			Yes
CeA:	1-1	All areas are prime farmland	
Celina			No
CeB:	2e-1	All areas are prime farmland	
Celina			No
CrA:	2w-5	Prime farmland if drained	
Crosby			No
CrB:	2e-4	Prime farmland if drained	
Crosby			No
Cu:	---	Not prime farmland	
Cut and fill land			No
Ee:	2w-1	All areas are prime farmland	
Eel			No
FoA:	2s-1	All areas are prime farmland	
Fox			No
FoB:	2e-3	All areas are prime farmland	
Fox			No
FoB2:	2e-3	All areas are prime farmland	
Fox			No
FoC2:	3e-1	Not prime farmland	
Fox			No

TABLE 26.--INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability units	Prime farmland	Hydric
Gn:	2w-1	All areas are prime farmland	
Genesee			No
Gp:	---	Not prime farmland	
Gravel Pits			No
HeA:	2w-3	Prime farmland if drained	
Henshaw			No
Ho:	2w-3	Prime farmland if drained	
Homer			No
Ka:	2w-3	Prime farmland if drained	
Kane			No
KeA:	1-1	All areas are prime farmland	
Kendallville			No
KeB:	2e-1	All areas are prime farmland	
Kendallville			No
Lc:	2w-4	Prime farmland if drained	
Lippincott			Yes
MlB:	2e-1	All areas are prime farmland	
Miamian			No
MlC2:	3e-1	Not prime farmland	
Miamian			No
MlD2:	4e-1	Not prime farmland	
Miamian			No
MlF2:	6e-1	Not prime farmland	
Miamian			No
Mn:	3w-2	Prime farmland if drained	
Montgomery			Yes
MrB:	2e-2	All areas are prime farmland	
Morley			No
MrB2:	2e-2	All areas are prime farmland	
Morley			No
MrC:	3e-3	Not prime farmland	
Morley			No

TABLE 26.--INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability units	Prime farmland	Hydric
MrC2:	3e-3	Not prime farmland	
Morley			No
MrD2:	4e-1	Not prime farmland	
Morley			No
MrE2:	6e-1	Not prime farmland	
Morley			No
MrF2:	7e-1	Not prime farmland	
Morley			No
Mu:	3w-2	Not prime farmland	
Muskego			Yes
NpA:	3w-1	Prime farmland if drained	
Nappanee			No
NpB:	3e-2	Prime farmland if drained	
Nappanee			No
OdA:	2w-5	Prime farmland if drained	
Odell			No
Pa:	3w-1	Not prime farmland	
Paulding			Yes
Pm:	2w-6	Prime farmland if drained	
Pewamo			Yes
Qu:	---	Not prime farmland	
Quarries			No
Ro:	2w-1	All areas are prime farmland	
Ross			No
ScB:	3e-2	All areas are prime farmland	
St. Clair			No
ScB2:	3e-2	All areas are prime farmland	
St. Clair			No
ScC:	4e-1	Not prime farmland	
St. Clair			No
ScC2:	4e-1	Not prime farmland	
St. Clair			No

TABLE 26.--INTERPRETIVE GROUPS--Continued

Map symbol and soil name	Land capability units	Prime farmland	Hydric
Sh:	2w-2	Prime farmland if drained	
Shoals			No
SlA:	2w-3	Prime farmland if drained	
Sleeth			No
So:	3w-2	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	
Sloan			Yes
WaB:	2e-3	All areas are prime farmland	
Warsaw			No
Wc:	2w-4	Prime farmland if drained	
Westland			Yes
We:	2w-6	Prime farmland if drained	
Wetzel			Yes