



United States
Department of
Agriculture



Natural
Resources
Conservation
Service

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

Soil Survey of Clark County, Ohio

Part I



How to Use This Soil Survey

This survey is divided into three parts. Part I includes general information about the survey area; descriptions of the general soil map units, detailed soil map units, and soil series in the area; and a description of how the soils formed. Part II describes the use and management of the soils and the major soil properties. This part may be updated as further information about soil management becomes available. Part III includes the maps.

On the **general soil map**, the survey area is 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** in Part I of this survey for a general description of the soils in your area.

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

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

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

The **Contents** in Part II shows which table has data on a specific land use for each detailed soil map unit. See the **Contents** in Part I and Part II for other sections of this publication that may address your specific needs.

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1991. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. This survey was made cooperatively by the Natural Resources Conservation Service, the Ohio Department of Natural Resources, Division of Soil and Water Conservation, the Ohio Agricultural Research and Development Center, and the Ohio State University Extension. It is part of the technical assistance furnished to the Clark Soil and Water Conservation District. The survey was materially aided by funds provided by the Clark County Commissioners.

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

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Cover: A farmstead in an area of Miamian silt loam, 2 to 6 percent slopes.

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

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Foreword

This soil survey contains information that can be used in land-planning programs in Clark County. It contains predictions of soil behavior for selected land uses. The survey 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 shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

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Soil Survey of Clark County, Ohio

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

CLARK COUNTY is in west-central Ohio (fig. 1). It is in the till plains division of the central lowlands province (Major Land Resource Area 111—Indiana-Ohio Till Plain). It has an area of about 401 square miles, or 256,883 acres. Springfield, the county seat, is near the center of the county. In 1990, the population of the county was about 147,548 and the population of Springfield was about 70,487 (Ohio Department of Commerce, 1991). These figures represent about a 1.8 percent decline in population for the county and a 2.9 percent decline for Springfield since 1980. Pike Township, in the northwestern part of the county, has experienced the greatest increase in population since 1980 (9.1 percent).

Most of the county is used for farming. The main enterprises are cash-grain farming and some livestock production and dairying. Urban or built-up land makes up about 12 percent of the county and is expanding at a moderate pace (USDA, 1971). Throughout most of the farmland in the county, a drainage system has been installed in areas of the wetter soils to improve crop production. Most soils are well suited or moderately well suited to field crops, pasture, and trees.

Most of Clark County is nearly level and gently sloping land that is dissected in some areas by small rivers and streams. Wetness is a major limitation affecting the use of many of the soils. The hazard of erosion is generally severe on sloping to steep soils on terminal moraines and along stream valleys.

This soil survey updates the survey of Clark County published in 1958 (USDA, 1958). It provides additional data and soil interpretations and has larger maps on a photographic background, which show the distribution of soils in greater detail.

General Nature of the County

This section provides general information about Clark County. It describes climate; physiography, relief, and drainage; bedrock geology; surficial geology; glacial history; natural resources; farming; and history.

Climate

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

In winter, the average temperature is 27.8 degrees F and the average daily minimum temperature is 19.0 degrees. The lowest temperature on record, which occurred at Springfield on January 19, 1974, is -26 degrees. In summer, the average temperature is 71.0 degrees and the average daily maximum temperature is 82.1 degrees. The highest temperature, which occurred on August 21, 1983, is 100 degrees.

Growing degree days are equivalent to "heat units." During the month, growing degree days accumulate by



Figure 1.—Location of Clark County in Ohio.

the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 37.82 inches. Of this, 19.47 inches, or about 51 percent, usually falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.60 inches at Springfield on June 26, 1971. Thunderstorms occur on about 40 days each year, and most occur in July.

The average seasonal snowfall is 9.5 inches. The greatest snow depth at any one time during the period of record was 22 inches on February 2, 1978. On an average, 9 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 8.0 inches on February 16, 1993.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 41 percent. The sun shines 67 percent of the time possible in summer and 41 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 11.9 miles per hour, in March.

Physiography, Relief, and Drainage

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

The land surfaces of Clark County can be described in five general divisions: (1) the nearly level flood plains and low alluvial terraces of the stream valleys; (2) the slightly higher, nearly level to gently undulating benches or outwash deposits of the glacial valleys; (3) the rolling to steep valley walls, produced either by stream dissection or constructive morainal deposits; (4) the predominantly undulating divides of the general upland level (mainly on the till plains); and (5) the recessional or end moraines and kames that protrude above the general upland level (Schmidt, 1982).

In general, the slope pattern is complex in the uplands and uniform and simple along the larger drainageways. Relief ranges from nearly level to steep, but the land surface is predominantly undulating. Nearly level areas occur principally on stream flood plains, outwash plains, valley trains, and stream terraces and in the uplands in depressions and on flats, particularly on the till plains. Hilly to steep or very steep areas occur most extensively along the valley walls of the major drainageways and on the moraines. These hilly to steep or very steep areas are in Pleasant and Moorefield Townships, in the northern and eastern parts of Springfield Township, and in the southeastern part of Mad River Township. Along the west wall of the Mad River Valley, between the Champaign County line and U.S. Highway 40 and for some distance westward, the topography is rough and steep and has apparently been formed in part by erosion that has taken place since the last glaciation. Otherwise, the topography of the county is essentially the same as when the Late Wisconsin ice sheet retreated.

The upland is about 1,000 to 1,100 feet above sea level. It slopes gently to the southwest. The highest elevation in the county, about 1,250 feet, is about 2 miles northeast of Catawba near the Champaign County line. The lowest elevation, 820 feet, is in the southwest corner where the Mad River crosses the county line.

Other than a very small area in the northeastern part of the county, which drains southeastward toward the Scioto River, the rest of the streams drain south to the Little Miami River or west and southwest to the Great Miami River. Besides the Little Miami River in the southeast, the major trunk streams include the

Beaver Creek-Buck Creek-Mad River system in the northeast, central, and western parts of the county. This drainage is for the most part natural, except for some channelization in some parts of the Mad River and except for the Clarence J. Brown Reservoir on Buck Creek northeast of the city of Springfield (Schmidt, 1982).

Bedrock Geology

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

Clark County is covered by various kinds and variable thicknesses of glacial drift left behind by continental glaciers during the most recent part of geologic history. Although the drift is more than 300 feet thick in the eastern part of the county, it is quite thin in the southwestern part where both glacial meltwater streams and modern streams have eroded through the drift and exposed the bedrock beneath. Two of these places of exposure are noteworthy. The first of these is the natural Buck Creek Gorge at Cliff Park in the city of Springfield. On this site, the Silurian (Niagaran) Cedarville and Springfield Dolomite (Lockport Dolomite) is exposed. The second is the north-south “manmade gorge” exposing the same rock units, formed by the construction of the four-lane U.S. Highway 68 between U.S. Highway 40 and the Interstate 70 bypass around the south side of Springfield. In addition, older Silurian formations (Euphemia, Massie, Laurel, Osgood, Dayton, and Brassfield in descending stratigraphic order) are exposed just over the southern border of the county along the Little Miami River in John Bryan State Park and in the Yellow Springs Creek as it flows through Glen Helen and west of Springfield near Limestone and Rock Way. Older Ordovician formations are exposed at Huffman Dam adjacent to Wright Patterson Air Force Base in Fairborn, Ohio (Schmidt, 1982).

Surficial Geology

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

The survey area was glaciated more than once. The deposits of an older Illinoian and possibly a pre-Illinoian ice advance, recognized farther south in Ohio, were reworked and covered by a younger Wisconsinan glaciation. These glacial drift deposits covered the bedrock and filled old preglacial stream valleys. The largest and deepest of these buried valleys is known as the Teays drainage system. This system enters the county from the southeast near

Plattsburg and trends northwestward on a line through Harmony and the Clarence J. Brown Reservoir and then leaves the county north and east of Tremont City. The depth to bedrock is more than 400 feet along this section of the buried Teays Valley (Schmidt, 1982).

There are two dominant types of glacial deposits that were left in the survey area. The first type is glacial till, which consists largely of clay mixed with boulders, gravel, sand, and silt. This unsorted material is deposited directly by glacial ice. Low, rolling or hummocky topography is characteristic of deposition by melting and retreating ice, which resulted in what is called ground moraine. Till deposited by ice, the terminus of which remains stationary for a time, results in a thicker and higher accumulation. Such topography, which is more contiguous and ridge-like than that resulting from deposition by melting and retreating ice, is referred to as end moraine. The second type of glacial deposits consists of stratified sand and gravel, sorted and deposited by running meltwater from the glacial ice. The most common type of stratified drift is the low, flat outwash plain deposited along meltwater streams (Schmidt, 1982).

Glacial History

Dr. Floyd R. Nave, professor emeritus, Wittenburg University, helped prepare this section.

When the Wisconsinan ice advanced to the south from northern Ohio, a topographic high in the bedrock of Logan County to the north split the ice into two lobes. The western lobe trended down the valley of a preglacial Miami River, and the eastern one trended down the valley of a preglacial Scioto River. Therefore, as the glaciers expanded, ice entered the county from both the northwest and the northeast, apparently abutted, and advanced southward toward the Ohio River. When the glacial ice retreated from the county, it melted away to the west and east as it had entered. Thus the major end moraines resulting from this retreat are oriented in a north-south direction in this interlobate area. The Springfield moraine north of the city and the Farmersville moraine along the western border of the county were deposited by the ice of the Miami lobe. East of Springfield, six end moraines (Pitchin, Thorp, Dolly Varden, South Charleston, Plattsburg, and Esboro) were deposited by ice of the Scioto lobe. These six individual end moraines become less distinct in the northern half of the county and comprise the wide Cable morainal belt.

Two major outwash systems trending north to south also occur in the county. The Kennard outwash system is an older and topographically higher one that begins north of the county and ends at Clifton Gorge. The

meltwater of this system came from the Scioto lobe, and the outwash is associated with the six end moraines deposited by ice of this lobe. In addition to providing the sands and gravels of the outwash, the meltwater also contributed significantly to the erosion of the gorge. The second major outwash system is that of the Mad River and its major tributaries, Buck Creek and Beaver Creek. This entire system is younger and lower than the Kennard system to the east and developed only after the westward recession of the Miami lobe of ice uncovered a topographically lower drainageway to the southwest. The meltwater of this system was probably responsible for forming most of the Cliff Park Gorge in the city of Springfield.

These extensive deposits of morainal material and outwash in Clark County constitute the parent material in which the soils of the county formed.

Natural Resources

The natural resources in Clark County include ground water, bedrock, and sand and gravel deposits.

Clark County has good water supplies to meet the needs of small municipal or industrial entities or for farm or home use. Water supplies are available generally in Clark County, either from glacial deposits or Silurian rock formations. Yields from consolidated rocks of Silurian age do not exceed about 200 gallons per minute and commonly are lower than 50 gallons per minute. Yields from glacial sand and gravel commonly range from about 25 gallons per minute to about 250 gallons per minute (Schmidt, 1982). Yields of 500 to more than 1,000 gallons per minute may be developed in permeable sand and gravel deposits adjacent to the Mad River (Schmidt, 1982). These deposits are primarily associated with areas of Ross, Tremont, and Warsaw soils. Ground-water conditions are poor in areas of eastern Clark County, where fine sands in the buried Teays Valley deposits may yield as little as 3 to 10 gallons per minute. Small areas in the southwestern part of Clark County, where thin, unconsolidated glacial deposits overlie the interbedded, nonwaterbearing shale and limestone bedrock of Ordovician age, have poor yields (Schmidt, 1982).

Limestone and dolomite interbedded with shale are the major components of bedrock in Clark County. These sedimentary rocks from the Silurian and Ordovician systems consist mostly of calcium carbonate or calcium and magnesium carbonate. The rocks of the Niagara group and of Clinton age are the most extensive of the formations that occur near the surface. The Cedarville Dolomite and Springfield Limestone (Lockport Dolomite) of the Niagara group

have been the principal formations quarried at Limestone City, Durbin, and Cold Springs. In 1947, nearly 40,000 tons of limestone was quarried in the county (Schmidt, 1982). Today, only the Springfield quarry (west of Springfield) remains open. In 1990, this quarry produced about 121,142 tons of crushed stone for road construction or resurfacing (Weisgarber, 1991).

Sand and gravel resources of Clark County are part of a larger resource of glacially derived sands and gravels that were deposited within the Great Miami River drainage area. The major portion of these deposits is within the outwash terraces confined to the valleys and tributaries of the Mad River and Little Miami River. The total original sand and gravel resource of Clark County is estimated at approximately 5.7 billion tons. Analyses of samples collected from widely spaced deposits throughout the county indicate that most of the remaining undeveloped sand and gravel resources will provide good-quality materials for construction aggregate, base, and fill. The undeveloped resource of sand and gravel in Clark County appears adequate to meet the demands of the region for many years. The remaining extractable resource is mostly in rural areas, where intense land-use competition is not expected to be encountered (Strubble, 1987).

Additional information regarding natural resources is available from the Ohio Department of Natural Resources and from various local agencies.

Farming

In 1987, there were 812 farms in Clark County. More than 76 percent of the land in the county was made up of farms. The average farm size was about 239 acres. Most farms ranged from about 10 to 49 acres, but some were smaller than 10 acres and a few were more than 2,000 acres in size (U.S. Department of Commerce, 1989).

In 1987, the principal crops grown were soybeans, on 60,285 acres; corn, on 58,918 acres; wheat, on 6,863 acres; and hay, on 7,490 acres. Other small grain, pasture, and specialty crops were grown on about 10,700 acres (U.S. Department of Commerce, 1989). The area used as woodland, including pastured woodland, was about 11,600 acres in 1987. The acreage of woodland and pasture has decreased in recent years as more areas are converted to cultivated land.

The major livestock in the county in 1987 consisted of cattle and calves, hogs and pigs, and chickens (U.S. Department of Commerce, 1989).

History

Prior to European settlement, the most recent inhabitants of the survey area were Miami and Shawnee Indians. Other tribes, such as Wyandot, Delaware, Ottawa, and Mingo, also inhabited the area. The Mad River Valley, with its herb gardens and mineral springs, was a favorite hunting ground and medicinal retreat (Kinnison, 1985).

Early French and English hunters and trappers and other European explorers and soldiers told stories of the great natural wealth and beauty of the area. The endless fresh clear water of the Mad River fed by numerous springs, the rich fertile lands of the valleys of the Little Miami and Mad Rivers, and the abundant forests of the smooth, hilly countryside attracted a continuous stream of settlers to the area.

Early settlements were primitive, but after the Treaty of Greenville was signed in 1795, settlement of the area increased. The first major settlement was established at Cribb's Station, at the forks of the Mad River, in the spring of 1796 (Kinnison, 1985).

The town of Springfield was laid out in 1803, the same year that Ohio became a state. Clark County was created from parts of Champaign, Greene, and Madison Counties by an act of the Ohio Legislature on March 1, 1818. The county was named in honor of General George Rogers Clark of the Revolutionary War. Progress became more rapid after the creation of Clark County. The first census of Clark County, taken in 1820, showed a population of 610. Growth and progress stopped for a while with the failure of the Second Bank of the United States and the Panic of 1819. Springfield, the county seat, was incorporated in 1827.

How This Survey Was Made

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

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

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

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

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of

management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

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

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

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the National Soil Survey Handbook of the Natural Resources Conservation Service. Among the references used were the soil survey of Clark County, Ohio, published in 1958 (USDA, 1958); "Pleistocene Geology of Clark County, Ohio" (Brown, 1948); "Water Resources of Clark County, Ohio" (Norris and others); and "Ground Water Resources of Clark County, Ohio" (Schmidt, 1982).

Prior to the soil survey modernization, a soil survey review team conducted an evaluation of the 1958 Clark County soil survey at the request of the Clark County Commissioners. A report of the evaluation was prepared and sent to the Soil Inventory Board for review. After reviewing the evaluation report, the Soil Inventory Board recommended a soil survey modernization program and outlined the work to be completed.

Before the fieldwork began, a detailed study of all existing laboratory data, soil survey reports, and research studies was conducted by the Clark County soil survey staff. U.S. Geological Survey topographic maps at a scale of 1:24,000 were used to relate land and image features.

A reconnaissance was made by vehicle before the soil scientists traversed the surface on foot, examining the soils. In some areas, such as the Mad River Valley and areas of the Bellefontaine, Carlisle, Fox, Homer, Mill Creek, and Wawaka soils, the delineations in the 1958 survey were determined to be less reliable than in other areas. In the areas where the soil pattern is very complex, traverses were spaced as close as 200 yards apart. In areas of the Crosby-Kokomo-Celina general soil map unit and in other areas where the soil pattern is relatively simple, traverses were spaced about one-quarter mile apart.

As they traversed the surface, the soil scientists divided the landscape into segments based on the landform and the position of the soils on the landform. For example, a flat would be separated from a swale, or a gently sloping knoll or side slope would be separated from a flat. In most areas, soil examinations along the traverses were made at points 50 to 200 yards apart, depending on the landscape and soil patterns.

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

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

Samples for chemical and physical analyses were taken from representative sites of several of the soils in the survey area. The Soil Characterization Laboratory, School of Natural Resources, Ohio State University, Columbus, Ohio, made the chemical and physical analyses. The results of the analyses are

stored in a computerized data file at the laboratory. The analyses for engineering properties were made by the Ohio Department of Transportation, Division of Highways, Bureau of Testing, Soils and Foundation Section, Columbus, Ohio. The laboratory procedures can be obtained on request from the respective laboratories. The results of the studies can be obtained from the School of Natural Resources, Ohio State University; the Ohio Department of Natural

Resources, Division of Soil and Water Conservation; and the Natural Resources Conservation Service, State Office, Columbus, Ohio.

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

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. 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.

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 or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

1. Miamian-Kokomo-Celina Association

Nearly level to steep soils

Setting

Landform: Till plains

Slope range: 0 to 30 percent

Composition

Percent of survey area: 28

Extent of components in the association:

Miamian soils—55 percent

Kokomo soils—10 percent

Celina soils—10 percent

Minor soils—25 percent

Soil Properties and Qualities

Miamian

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits, micro-highs

Parent material: Thin layer of loess over glacial till

Surface texture: Silt loam, silty clay loam, clay loam

Slope: Nearly level to steep

Kokomo

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial till

Surface texture: Silty clay loam

Slope: Nearly level

Celina

Depth class: Very deep

Drainage class: Moderately well drained

Position on the landform: Micro-highs, micro-lows, footslopes, backslopes

Parent material: Glacial till

Surface texture: Silt loam

Slope: Nearly level and gently sloping

Minor Soils

- Crosby
- Eldean
- Genesee
- Milton

Use and Management

Major uses: Cropland, hay and pasture, residential areas

Management concerns: Erosion, low strength, shrink-swell, restricted permeability, slope, wetness, frost action

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

2. Miamian-Eldean-Kokomo Association

Nearly level to steep soils

Setting

Landform: Kame terraces, till plains

Slope range: 0 to 30 percent

Composition

Percent of survey area: 8

Extent of components in the association:

Miamian soils—30 percent

Eldean soils—25 percent

Kokomo soils—10 percent

Minor soils—35 percent

Soil Properties and Qualities

Miamian

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits

Parent material: Thin layer of loess over glacial till

Surface texture: Silt loam, silty clay loam, clay loam

Slope: Nearly level to steep

Eldean

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders

Parent material: Glacial outwash

Surface texture: Silty clay loam, clay loam

Slope: Nearly level to steep

Kokomo

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial till

Surface texture: Silty clay loam

Slope: Nearly level

Minor Soils

- Drummer
- Rodman
- Thackery
- Westland

Use and Management

Major uses: Cropland, hay and pasture, woodland, residential areas

Management concerns: Droughtiness, poor filtration of

effluent, erosion, slope, shrink-swell, low strength, restricted permeability

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

3. Crosby-Kokomo-Celina Association

Nearly level and gently sloping soils

Setting

Landform: Till plains

Slope range: 0 to 6 percent

Composition

Percent of survey area: 11

Extent of components in the association:

Crosby soils—45 percent

Kokomo soils—30 percent

Celina and similar soils—15 percent

Minor soils—10 percent

Soil Properties and Qualities

Crosby

Depth class: Very deep

Drainage class: Somewhat poorly drained

Position on the landform: Footslopes, backslopes

Parent material: Glacial till

Surface texture: Silt loam

Slope: Nearly level and gently sloping

Kokomo

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial till

Surface texture: Silty clay loam

Slope: Nearly level

Celina

Depth class: Very deep

Drainage class: Moderately well drained

Position on the landform: Micro-highs, micro-lows, footslopes, backslopes

Parent material: Glacial till

Surface texture: Silt loam

Slope: Nearly level and gently sloping

Minor Soils

- Genesee

- Millsdale
- Sloan

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Erosion, restricted permeability, low strength, wetness, frost action, ponding, shrink-swell

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

4. Miamian-Milton-Millsdale Association

Nearly level to sloping soils

Setting

Landform: Till plains

Slope range: 0 to 12 percent

Composition

Percent of survey area: 2

Extent of components in the association:

Miamian and similar soils—40 percent

Milton soils—25 percent

Millsdale soils—10 percent

Minor soils—25 percent

Soil Properties and Qualities

Miamian

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits

Parent material: Thin layer of loess over glacial till

Surface texture: Silt loam, silty clay loam, clay loam

Slope: Nearly level to sloping

Milton

Depth class: Moderately deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits, micro-highs

Parent material: Glacial till and residuum derived from limestone or dolomite

Surface texture: Silt loam, silty clay loam

Slope: Nearly level to sloping

Millsdale

Depth class: Moderately deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial till and, in some areas, the underlying residuum derived from limestone or dolomite

Surface texture: Silty clay loam

Slope: Nearly level

Minor Soils

- Donnelsville
- Eldean
- Randolph
- Ross

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Droughtiness, depth to bedrock, restricted permeability, low strength, erosion, seepage, thin layers, shrink-swell, slope

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

5. Kokomo-Strawn-Celina Association

Nearly level to sloping soils

Setting

Landform: Till plains

Slope range: 0 to 12 percent

Composition

Percent of survey area: 3

Extent of components in the association:

Kokomo soils—45 percent

Strawn and similar soils—25 percent

Celina and similar soils—20 percent

Minor soils—10 percent

Soil Properties and Qualities

Kokomo

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial till

Surface texture: Silty clay loam

Slope: Nearly level

Strawn

Depth class: Very deep

Drainage class: Well drained
Position on the landform: Shoulders, summits, micro-highs
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level to sloping

Celina

Depth class: Very deep
Drainage class: Moderately well drained
Position on the landform: Footslopes, backslopes, micro-lows
Parent material: Glacial till
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Minor Soils

- Crosby
- Milford
- Westland

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Ponding, restricted permeability, low strength, frost action, erosion, wetness, shrink-swell
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

6. Strawn-Kokomo Association

Nearly level to steep soils

Setting

Landform: Till plains
Slope range: 0 to 30 percent

Composition

Percent of survey area: 15
Extent of components in the association:
 Strawn and similar soils—45 percent
 Kokomo soils—25 percent
 Minor soils—30 percent

Soil Properties and Qualities

Strawn

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

Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level to steep

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Celina
- Crosby
- Eldean

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Erosion, low strength, restricted permeability, shrink-swell, frost action, wetness, ponding
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

7. Kokomo-Strawn-Crosby Association

Nearly level to sloping soils

Setting

Landform: Till plains
Slope range: 0 to 12 percent

Composition

Percent of survey area: 5
Extent of components in the association (fig. 2):
 Kokomo soils—45 percent
 Strawn and similar soils—30 percent
 Crosby soils—15 percent
 Minor soils—10 percent

Soil Properties and Qualities

Kokomo

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial till
Surface texture: Silty clay loam

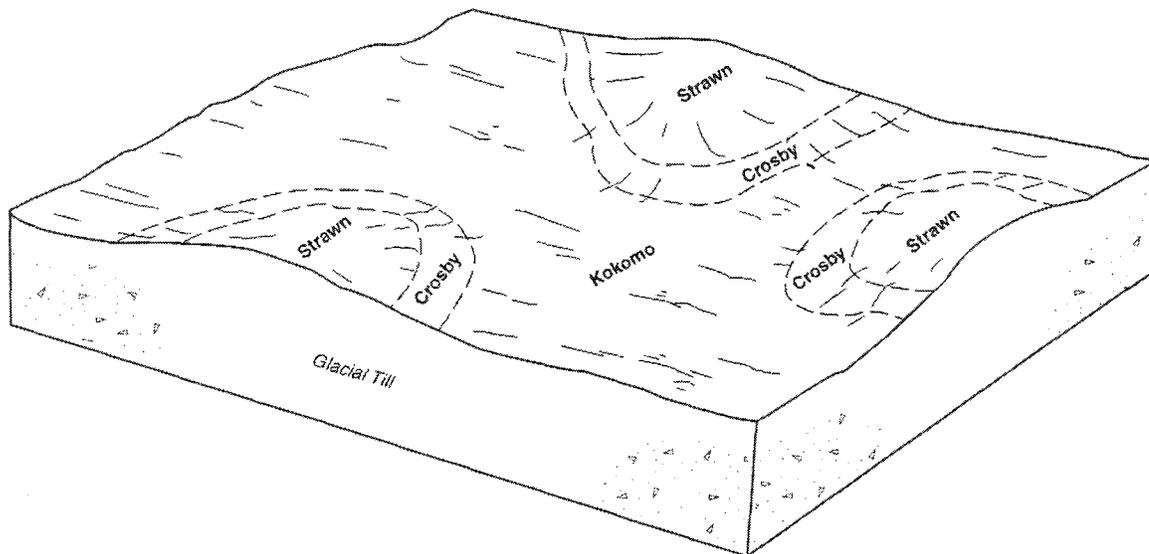


Figure 2.—Typical pattern of soils in the Kokomo-Strawn-Crosby association.

Slope: Nearly level

Strawn

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Shoulders, summits

Parent material: Glacial till

Surface texture: Silt loam, silty clay loam

Slope: Nearly level and gently sloping

Crosby

Depth class: Very deep

Drainage class: Somewhat poorly drained

Position on the landform: Footslopes, backslopes, micro-lows

Parent material: Glacial till

Surface texture: Silt loam

Slope: Nearly level to sloping

Minor Soils

- Celina
- Milford

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Ponding, restricted permeability, low strength, frost action, erosion, shrink-swell, wetness

Management measures: Conservation tillage and

residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

8. Eldean-Lippincott Association

Nearly level to sloping soils

Setting

Landform: Outwash plains, valley trains

Slope range: 0 to 12 percent

Composition

Percent of survey area: 13

Extent of components in the association (fig. 3):

Eldean soils—40 percent

Lippincott soils—25 percent

Minor soils—35 percent

Soil Properties and Qualities

Eldean

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits, micro-highs, risers, treads

Parent material: Glacial outwash

Surface texture: Silt loam, silty clay loam

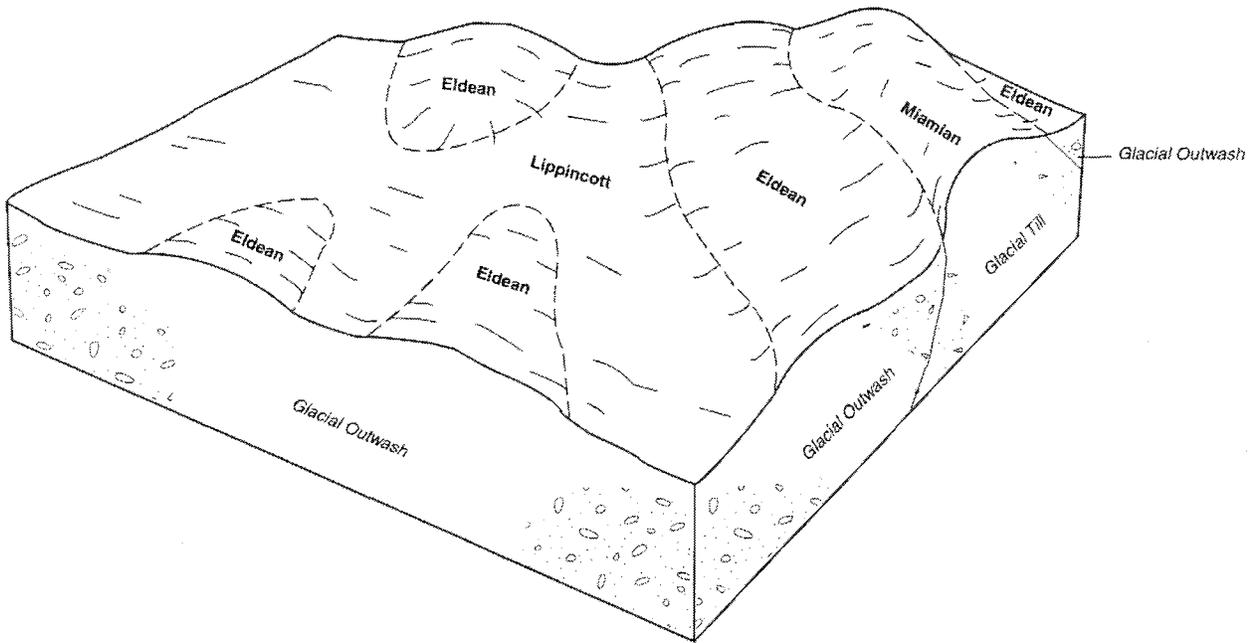


Figure 3.—Typical pattern of soils in the Eldean-Lippincott association.

Slope: Nearly level to sloping

Lippincott

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial outwash

Surface texture: Silty clay loam

Slope: Nearly level

Minor Soils

- Miamian
- Savona
- Sloan
- Tremont
- Warsaw
- Westland

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Droughtiness, poor filtration, erosion, slope, shrink-swell, low strength

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-

changing structures, maintenance and improvement of drainage systems

9. Drummer-Ockley-Eldean Association

Nearly level and gently sloping soils

Setting

Landform: Outwash plains

Slope range: 0 to 6 percent

Composition

Percent of survey area: 2

Extent of components in the association:

Drummer soils—45 percent

Ockley soils—15 percent

Eldean soils—10 percent

Minor soils—30 percent

Soil Properties and Qualities

Drummer

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Footslopes, open depressions, drainageways

Parent material: Glacial outwash

Surface texture: Silty clay loam

Slope: Nearly level

Ockley

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits, micro-highs, treads

Parent material: Glacial outwash

Surface texture: Silt loam

Slope: Nearly level and gently sloping

Eldean

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Backslopes, shoulders, summits, micro-highs, treads, risers

Parent material: Glacial outwash

Surface texture: Silt loam, silty clay loam, gravelly clay loam

Slope: Nearly level and gently sloping

Minor Soils

- Miamian
- Waupecan
- Waynetown

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Ponding, low strength, frost action, restricted permeability, erosion, slope

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

10. Tremont-Ross-Sloan Association

Nearly level soils

Setting

Landform: Flood plains

Slope range: 0 to 2 percent

Composition

Percent of survey area: 3

Extent of components in the association:

Tremont soils—35 percent

Ross soils—20 percent

Sloan soils—15 percent

Minor soils—30 percent

Soil Properties and Qualities

Tremont

Depth class: Very deep

Drainage class: Moderately well drained

Position on the landform: Steps on flood plains

Parent material: Alluvium

Surface texture: Silt loam

Slope: Nearly level

Ross

Depth class: Very deep

Drainage class: Well drained

Position on the landform: Steps on flood plains

Parent material: Alluvium

Surface texture: Silt loam, silty clay loam

Slope: Nearly level

Sloan

Depth class: Very deep

Drainage class: Very poorly drained

Position on the landform: Steps on flood plains

Parent material: Alluvium

Surface texture: Silt loam

Slope: Nearly level

Minor Soils

- Eldean
- Lippincott
- Savona

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Flooding, low strength, frost action, wetness, restricted permeability

Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

11. Eldean-Ockley-Westland Association

Nearly level to sloping soils

Setting

Landform: Outwash plains and terraces

Slope range: 0 to 12 percent

Composition

Percent of survey area: 9

Extent of components in the association:

Eldean soils—25 percent

Ockley and similar soils—25 percent
 Westland soils—15 percent
 Minor soils—35 percent

Soil Properties and Qualities

Eldean

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads, risers
Parent material: Glacial outwash
Surface texture: Silt loam, gravelly clay loam
Slope: Nearly level to sloping

Ockley

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads, risers
Parent material: Glacial outwash
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Westland

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial outwash
Surface texture: Silty clay loam
Slope: Nearly level

Minor Soils

- Lippincott
- Sloan
- Waynetown

Use and Management

Major uses: Cropland, hay and pasture
Management concerns: Low strength, erosion, slope, droughtiness, poor filtration, shrink-swell, ponding
Management measures: Conservation tillage and residue management, construction and maintenance of grassed waterways and grade-changing structures, maintenance and improvement of drainage systems

12. Westland-Milford-Ockley Association

Nearly level and gently sloping soils

Setting

Landform: Outwash plains and lacustrine areas
Slope range: 0 to 6 percent

Composition

Percent of survey area: 1
Extent of components in the association:
 Westland soils—30 percent
 Milford soils—20 percent
 Ockley soils—15 percent
 Minor soils—35 percent

Soil Properties and Qualities

Westland

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Glacial outwash
Surface texture: Silty clay loam
Slope: Nearly level

Milford

Depth class: Very deep
Drainage class: Very poorly drained
Position on the landform: Footslopes, open depressions, drainageways
Parent material: Lacustrine sediments
Surface texture: Silty clay loam
Slope: Nearly level

Ockley

Depth class: Very deep
Drainage class: Well drained
Position on the landform: Backslopes, shoulders, summits, micro-highs, treads
Parent material: Glacial outwash
Surface texture: Silt loam
Slope: Nearly level and gently sloping

Minor Soils

- Eldean
- Miamian
- Millsdale
- Sloan

Use and Management

Major uses: Cropland, hay and pasture

Management concerns: Ponding, low strength,
restricted permeability, frost action, erosion, slope

Management measures: Conservation tillage and
residue management, construction and
maintenance of grassed waterways and grade-
changing structures, maintenance and
improvement of drainage systems

Formation of the Soils

In this section the major factors of soil formation are described and related to the soils in Clark County. Also, some of the processes of soil formation are described.

Factors of Soil Formation

Soil is a three-dimensional natural body capable of supporting plant growth. The nature of the soil at a specific site is the result of the interaction of many factors and processes. The major factors of soil formation are parent material, climate, living organisms, relief, and time.

Parent Material

The material in which a soil formed is called parent material. Most of the parent material in Clark County was deposited by the last glacier that covered the area thousands of years ago or by meltwater from this glacier. Some other parent materials are older dolomitic limestone bedrock, more recent alluvium deposited by modern streams, and organic deposits from decaying plants.

Glacial till was deposited directly beneath glacial ice and was not significantly acted upon by water. The till contains a variety of particles ranging from clay to large stones. Most pebbles are angular; this shape indicates little water action. Although most of the material in the till is of local origin, some igneous stones were carried from parts of Canada. The glacial till at the surface was deposited during the Wisconsin glacialiation. Celina, Crosby, Kokomo, Strawn, and Miamian soils are examples of soils that formed in glacial till. Meltwater deposits were laid down by water from the melting glacier. Sand and gravel were deposited in rapidly moving, sloping streams and over broad plains. Eldean, Lippincott, Ockley, Rush, and Warsaw soils formed in sandy and gravelly deposits on stream terraces or outwash plains. Where streams became more level, fine sand and silt particles were deposited as lacustrine sediments in local lake basins. Patton soils formed in these fine sand and silt sediments.

Dolomitic limestone is the parent material of the

Donnelsville, Millsdale, Milton, and Randolph soils. It has a very high calcium carbonate equivalent. It is not violently effervescent, however, because of the dolomitic nature of the limestone.

Alluvium is the parent material of the soils on flood plains. Alluvial material accumulates when fresh sediments are added by stream overflow. The deposits vary widely, depending on the gradient of the stream and the source of the sediment. Alluvial sediment is stratified because deposition occurs in three basic stages. Gravel and stones are deposited on the streambed; sand is deposited as bars along meander inner banks; and sand, silt, and clay are deposited during flooding. Genesee, Ross, Sloan, and Tremont soils formed in alluvium. Carlisle soils and the upper part of Adrian and Linwood soils formed in decayed plant material that accumulated in marshes and fens. The permanent wetness slowed decomposition, and the organic matter accumulated.

Climate

The climate in Clark County is uniform enough that it has not greatly contributed to differences among the soils. It has favored physical change and chemical weathering of the parent material and the activity of living organisms.

The amount of precipitation varies as a result of micro-climate. In general, however, runoff on steep slopes reduces the amount of effective precipitation and drainage in depressions increases it. Rainfall has been adequate to leach from the upper part of the subsoil any carbonates that were in the parent material of some of the soils on uplands and terraces.

Wetting and drying cycles have resulted in the translocation of clay minerals and the formation of soil structure.

The range in temperature has favored both physical change and chemical weathering of the parent material. Freezing and thawing aided the formation of soil structure. Warm temperatures in summer favored chemical reactions in the weathering of the primary minerals. Rainfall and temperatures have been conducive to plant growth and the accumulation of organic matter in all of the soils.

Living Organisms

The vegetation under which a soil forms influences the color, structure, and content of organic matter. The surface layer of soils that formed under trees is generally lighter in color than that of soils that formed under grass. Grasses generally return more organic matter to the soil than trees do. Grasses also provide shelter for many burrowing animals that alter the structure and thickness of soil horizons. Earthworms, burrowing insects, and small animals are constantly mixing the soil, making it more porous to air and water and adding organic residue. Bacteria, fungi, and other micro-organisms contribute to the breakdown of organic residue. Generally, fungi are more active in acid soils and bacteria in alkaline soils.

About six native plant communities are recognized as the natural vegetation of Clark County at the time of the earliest land surveys (Gordon, 1966). The dominant forest type was the mixed oak forest. This forest type consisted primarily of white oak, black oak, chestnut oak, and some hickory. This plant community is associated with the better drained, more sloping areas of Eldean, Miamian, and Strawn soils.

Beech forests occupied the glacial till plain in the northwestern part of Clark County. These forests consisted mainly of beech, sugar maple, red oak, white ash, and white oak. Celina, Crosby, Kokomo, and Miamian soils are associated with areas that were beech forests.

Small areas of prairie grasslands were scattered mainly across the eastern two-thirds of Clark County. Most of these grass-dominated communities were associated with the wetter soils, such as Drummer, Kokomo, Lippincott, and Westland soils. The drier prairies and borders were dominated by big bluestem, little bluestem, switchgrass, and indiagrass. These areas are associated with the nearly level areas of Eldean, Ockley, and Rush soils.

Oak-sugar maple forests consisted dominantly of oaks and maples, walnut, ash, elm, basswood, and hickory. These forests are associated with Eldean, Lippincott, and Westland soils in the western part of the county.

A minor area of elm-ash swamp forest in the extreme southwestern part of the county consisted of various elms, ash, and maples and included sycamore and cottonwood in the wettest areas. This area is associated with the Eldean, Lippincott, Ross, and Tremont soils.

The marsh and fen plant communities are associated with the very poorly drained Adrian, Carlisle, and Linwood soils. These communities consisted of a wide variety of water-tolerant species,

including bulrushes, giant reedgrass, wild rice, cattail, bur-reed, wapato, pickerelweed, and rose mallow.

Human activities also affect soil formation.

Examples of these activities are cultivation, seeding, artificial drainage, irrigation, and cutting and filling. Accelerated erosion caused by clearing and cultivating the sloping soils, such as some areas of Eldean and Miamian soils, illustrates the impact of humans on soil formation. The loss of the surface soil and the compaction of the subsoil affect runoff and plant growth. Ditches and subsurface drains have been used in large areas of the Drummer and Westland soils. Artificial drainage reduces the content of organic matter and affects the processes of soil formation. Adding lime or fertilizer also affects the long-term development of the soil.

Relief

Relief, along with parent material, affects the natural drainage of soils. It influences the amount of runoff and the depth to a seasonal high water table.

Generally, steeper soils have better drainage than nearly level soils. If the extent of natural drainage differs, different soils can form in the same parent material. For example, both Drummer and Rush soils formed in glacial outwash deposits. Rush soils are in the higher positions, and the water table generally is more than 6 feet below the surface. Rush soils are well drained. Drummer soils, however, are in low, nearly level areas, and the water table is near or above the surface. These soils are very poorly drained.

A drainage sequence, or soil catena, is a group of soils that formed in the same parent material but differ in the extent of natural drainage. For example, the well drained Miamian soils, the moderately well drained Celina soils, the somewhat poorly drained Crosby soils, and the very poorly drained Kokomo soils make up a drainage sequence. All of these soils formed in silt loam, loam, or clay loam glacial till.

Time

The length of time the parent material has been exposed to the soil-forming processes affects the nature of the soil that forms. The youngest soils in Clark County are those that formed in recent stream deposits. Genesee, Ross, Sloan, and Tremont soils are examples. Younger soils have less well defined horizons than the older soils.

The glacial deposits in Clark County are of Wisconsinan age and are geologically young. Nevertheless, sufficient time has elapsed for the active forces of climate, plants, and animals to produce

distinct horizons. In most of the soils, carbonates have been leached, structure has developed in the subsoil, and organic matter has accumulated in the surface layer.

Processes of Soil Formation

Soil forms through complex, continuing processes. These processes include addition, removal, transfer, and alteration.

The accumulation of organic matter in the formation of mineral soils is the addition process. The addition of organic residue has produced a dark surface layer. Drummer, Kokomo, Lippincott, and Patton soils are examples of soils in which this process has taken place. The upper part of the profile in these soils originally was not darker than the lower part.

The loss of lime from the upper 2 or 3 feet of many of the soils in Clark County is an example of the removal process. Although the parent material was limy, water percolating through the soil has leached the lime from the upper part of the soil. Celina and Crosby soils have had carbonates leached from the upper part of the profile.

Water is the carrier for most of the transfers that have occurred in the soils in Clark County. Clay has

been transferred from the A horizon to the B horizon in many of the soils. The A horizon has become a zone of eluviation and the B horizon a zone of illuviation. Thin clay films are in pores and on the faces of peds in the B horizon of some soils. The clay has been transferred from the A horizon. The presence of clay films is an important criterion in soil classification.

The reduction and solution of ferrous iron are examples of the alteration process. This process has taken place in the very poorly drained soils. Reduction of iron, or gleying, is evident in Drummer, Patton, and Sloan soils. It is the result of a recurring water table. Gray soil colors indicate gleying. Reduced iron is soluble, but the iron in the soils in Clark County commonly has remained in the horizon where it originated or has settled in an underlying horizon. Iron can be reoxidized and segregated in places to form yellowish brown mottles that are brighter than the surrounding soil. The alteration of iron causes mottling in soils that are not well drained.

To a varying degree, each of the four soil-forming processes has affected all of the soils in Clark County. The accumulation of organic matter has been prominent in the formation of Adrian and Carlisle soils. The removal of carbonates and the transfer of clay have been prominent in the formation of other soils.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 4 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqualf (*Aqu*, meaning water, 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; 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 Ochraqualfs (*Ochr*, indicating a light colored surface layer, plus *aqualf*, the suborder of the Alfisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic 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 known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Aeric Ochraqualfs.

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 class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Aeric Ochraqualfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each 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" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999). 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."

Adrian Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately slow to moderately rapid in the organic material and rapid in the substratum

Parent material: Organic material over gravelly, loamy, and sandy outwash

Landforms: Outwash plains and till plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Adjacent soils: Carlisle, Eldean, Lippincott
Taxonomic classification: Sandy or sandy-skeletal, mixed, euic, mesic Terric Medisapristis

Typical Pedon

Adrian muck, drained, about 2.5 miles south of New Carlisle, in Bethel Township; about 660 feet north and 2,245 feet west of the center of sec. 26, T. 3, R. 9:

- Oa1—0 to 10 inches; muck (sapric material), black (N 2/0) broken face and rubbed; about 5 percent fibers, less than 5 percent rubbed; moderate medium granular structure; very friable; primarily herbaceous fibers; neutral; abrupt wavy boundary.
- Oa2—10 to 22 inches; muck (sapric material), very dark gray (10YR 3/1) broken face and rubbed; about 10 percent fibers, about 5 percent rubbed; weak coarse subangular blocky structure; very friable; primarily herbaceous fibers; slightly acid; gradual wavy boundary.
- 2C1—22 to 28 inches; brown (10YR 5/3) very gravelly sandy loam; single grain; loose; few gray (10YR 5/1) gravelly silt loam bodies; about 55 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.
- 2C2—28 to 80 inches; brown (10YR 5/3) very gravelly loamy sand; single grain; loose; about 55 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the organic material: 16 to 50 inches

Content of rock fragments: 2C horizon—30 to 60 percent

Surface tier:

Color—hue of 10YR or neutral, value of 2, chroma of 0 to 3

Texture—muck (sapric material)

Subsurface tier:

Color—hue of 10YR, 7.5YR, or neutral, value of 2 or 3, chroma of 0 to 3

Texture—sapric material

2C horizon:

Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 3

Texture—the gravelly or very gravelly analogs of sandy loam and loamy sand

Carlisle Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately slow to moderately rapid

Parent material: Organic materials more than 51 inches thick

Landforms: Outwash plains and till plains

Position on the landform: Depressions

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Lippincott

Taxonomic classification: Euic, mesic Typic Medisapristis

Typical Pedon

Carlisle muck, undrained, about 3.5 miles south of New Carlisle, in Bethel Township; about 740 feet east and 265 feet north of the center of sec. 25, T. 3, R. 9:

- Oa1—0 to 10 inches; sapric material, black (10YR 2/1) broken face and rubbed; about 10 percent fibers, less than 5 percent rubbed; weak fine granular structure; friable; common weakly decomposed wood fragments; neutral; abrupt smooth boundary.
- Oa2—10 to 20 inches; sapric material, dark brown (7.5YR 3/2) broken face, very dark brown (10YR 2/2) rubbed; about 15 percent fibers, less than 10 percent rubbed; weak fine granular structure; friable; common weakly decomposed wood fragments; neutral; abrupt smooth boundary.
- Oa3—20 to 35 inches; sapric material, black (10YR 2/1) broken face and rubbed; about 15 percent fibers, about 10 percent rubbed; weak coarse granular structure; friable; neutral; clear wavy boundary.
- Oa4—35 to 50 inches; sapric material, dark reddish brown (5YR 3/3) broken face, dark reddish brown (5YR 2.5/2) rubbed; about 30 percent fiber, about 12 percent rubbed; massive; friable; neutral; clear wavy boundary.
- Oa5—50 to 80 inches; sapric material, dark brown (10YR 3/3) broken face, dark reddish brown (5YR 2/2) rubbed; about 50 percent fiber, about 15 percent rubbed; massive; friable; neutral.

Range in Characteristics

Thickness of the organic material: 51 to 80 inches

Surface tier:

Color—hue of 10YR, value of 2, chroma of 1

Texture—muck (sapric material)

Subsurface tier:

Color—hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, chroma of 1 to 3
Texture—sapric material

Bottom tier:

Color—hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, chroma of 2 or 3

Casco Series

Depth class: Very deep

Drainage class: Somewhat excessively drained

Permeability: Moderate in the solum and rapid in the substratum

Parent material: Sandy and gravelly glacial outwash deposits

Landforms: Outwash plains and outwash terraces

Position on the landform: Knolls, backslopes, shoulders

Slope range: 6 to 20 percent

Adjacent soils: Eldean, Miamian, Rodman

Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs

Typical Pedon

Casco gravelly loam, 12 to 20 percent slopes, eroded, about 1.8 miles north of New Moorefield, in Moorefield Township; about 660 feet south and 1,030 feet west of the northeast corner of sec. 11, T. 5, R. 10:

Ap—0 to 7 inches; dark brown (7.5YR 4/2) gravelly loam, brown (7.5YR 4/4) dry; about 35 percent brown (10YR 4/4) clay loam mixed from the subsoil; moderate medium and fine granular structure; friable; many medium and fine roots; about 15 percent gravel; neutral; abrupt wavy boundary.

Bt1—7 to 13 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; common medium and fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; about 10 percent gravel; neutral; clear wavy boundary.

Bt2—13 to 17 inches; brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; common medium and fine roots; few distinct dark brown (7.5YR 4/2) clay films on faces of peds; about 30 percent gravel; slightly alkaline; clear wavy boundary.

2C1—17 to 22 inches; yellowish brown (10YR 5/4) gravelly loamy coarse sand; single grain; loose; few medium and fine roots; about 20 percent gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

2C2—22 to 80 inches; brown (10YR 5/3) gravelly coarse sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 10 to 24 inches

Depth to carbonates: 10 to 20 inches

Content of coarse fragments: Ap horizon—5 to 35 percent; Bt horizon—5 to 30 percent; C horizon—5 to 55 percent

Ap horizon:

Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 2 or 3

Texture—loam, silt loam, gravelly loam

Bt horizon:

Color—hue of 10YR, 7.5YR, or 5YR, value of 3 to 5, chroma of 3 or 4

Texture—clay loam, loam, or the gravelly analogs of these textures

2C horizon:

Color—hue of 10YR or 7.5YR, value of 4 to 6, chroma of 3 or 4

Texture—loamy coarse sand, coarse sand, sand, or the gravelly and very gravelly analogs of these textures

Celina Series

Depth class: Very deep

Drainage class: Moderately well drained

Permeability: Moderately slow

Parent material: Glacial till

Landform: Till plains

Position on the landform: Low knolls, backslopes, footslopes, micro-highs, micro-lows

Slope range: 0 to 6 percent

Adjacent soils: Crosby, Kokomo, Miamian, Strawn

Taxonomic classification: Fine, mixed, mesic Aquic Hapludalfs

Typical Pedon

Celina silt loam, 2 to 6 percent slopes, about 3.5 miles northeast of South Vienna, in Pleasant Township; about 1,980 feet northeast of the intersection of Callahan Road and North Houston Pike along Houston Pike, then 580 feet east:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common fine roots; few rock fragments; strongly acid; abrupt smooth boundary.

BE—8 to 16 inches; brown (10YR 5/3) silty clay loam; moderate medium subangular blocky structure;

firm; common fine roots; many faint grayish brown (10YR 5/2) silt coatings on faces of peds; common distinct black (10YR 2/1) stains (iron and manganese oxides); few rock fragments; slightly acid; clear wavy boundary.

Bt—16 to 27 inches; dark yellowish brown (10YR 4/4) clay; few fine distinct yellowish brown (10YR 5/6) and few fine distinct dark grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine black (10YR 2/1) concretions (iron and manganese oxides); about 5 percent rock fragments; neutral; clear wavy boundary.

BC—27 to 32 inches; yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C—32 to 80 inches; yellowish brown (10YR 5/4) loam; massive; firm; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Depth to carbonates: 18 to 40 inches

Thickness of the loess mantle: 8 to 16 inches

Content of rock fragments: Bt horizon—2 to 10 percent; C horizon—5 to 15 percent

Ap horizon:

Color—hue of 10YR, value of 4, chroma of 2 or 3

Texture—silt loam

BE horizon:

Color—hue of 10YR, value of 5, chroma of 3 to 6

Texture—silt loam, silty clay loam

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6

Texture—clay loam, silty clay loam, clay

C horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4

Texture—loam

Crosby Series

Depth class: Very deep

Drainage class: Somewhat poorly drained

Permeability: Slow and very slow

Parent material: Glacial till

Landform: Till plains

Position on the landform: Footslopes, backslopes, micro-highs, micro-lows

Slope range: 0 to 6 percent

Adjacent soils: Celina, Kokomo, Miamian, Strawn

Taxonomic classification: Fine, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Crosby silt loam, 0 to 2 percent slopes, about 3 miles west of North Hampton, in Pike Township; about 2,060 feet north and 1,190 feet west of the center of sec. 21, T. 3, R. 10:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; moderate fine granular structure; friable; common fine roots; few rock fragments; strongly acid; abrupt smooth boundary.

Bt1—9 to 14 inches; dark yellowish brown (10YR 4/4) clay; common distinct dark grayish brown (10YR 4/2) and common distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few rock fragments; strongly acid; clear wavy boundary.

Bt2—14 to 20 inches; dark yellowish brown (10YR 4/4) clay; many distinct dark grayish brown (10YR 4/2) and common distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; about 5 percent rock fragments; strongly acid; clear wavy boundary.

Bt3—20 to 25 inches; dark yellowish brown (10YR 4/4) clay; many distinct dark grayish brown (10YR 4/2) and common distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; about 10 percent rock fragments; slightly effervescent; slightly alkaline; clear wavy boundary.

C—25 to 80 inches; yellowish brown (10YR 5/4) loam; common distinct yellowish brown (10YR 5/6) mottles; massive; firm; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Depth to carbonates: 20 to 40 inches

Thickness of the loess mantle: 0 to 18 inches

Content of rock fragments: Bt horizon—0 to 10 percent; C horizon—5 to 12 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2

Texture—silt loam

Bt horizon:

Color—hue of 10YR, value of 4 to 6, chroma of 1 to 6

Texture—clay loam, silty clay loam, clay

BC and C horizons:

Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4

Texture—loam

Donnelsville Series*Depth class:* Deep or very deep*Drainage class:* Well drained*Permeability:* Moderate*Parent material:* Colluvium and residuum derived from limestone or dolomite*Landform:* Till plains*Position on the landform:* Footslopes, backslopes*Slope range:* 18 to 70 percent*Adjacent soils:* Eldean, Miamian, Milton*Taxonomic classification:* Loamy-skeletal, carbonatic, mesic Eutrochreptic Rendolls**Typical Pedon**

Donnelsville very channery loam, in an area of Donnelsville-Rock outcrop complex, 30 to 70 percent slopes, about 1.9 miles southwest of Enon, in Mad River Township; about 130 feet east and 845 feet south of the northwest corner of sec. 5, T. 3, R. 8:

A—0 to 14 inches; very dark gray (10YR 3/1) very channery loam, very dark gray (10YR 3/1) dry; weak fine and very fine granular structure; friable; common medium and fine roots; about 55 percent rock fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bw1—14 to 23 inches; brown (10YR 4/3) extremely channery loam; weak fine and very fine granular structure; friable; common medium and fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 60 percent rock fragments; strongly effervescent; moderately alkaline; clear irregular boundary.

Bw2—23 to 30 inches; yellowish brown (10YR 5/4) extremely channery loam; weak fine and very fine granular structure; friable; common medium and fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; about 80 percent rock fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

C—30 to 55 inches; light yellowish brown (10YR 6/4) extremely channery loam; common distinct yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots; about 85 percent rock fragments; strongly effervescent; strongly alkaline; clear smooth boundary.

2R—55 to 58 inches; dolomite.

Range in Characteristics*Thickness of the solum:* 24 to 48 inches*Thickness of the mollic epipedon:* 10 to 19 inches*Depth to bedrock:* 40 to 80 inches*Content of rock fragments:* A horizon—15 to 60 percent; Bw horizon—35 to 85 percent; C horizon—60 to 90 percent**A horizon:**

Color—hue of 10YR or 7.5YR, value of 2 or 3, chroma of 1 to 3

Texture—the channery or very channery analogs of loam or silt loam

Bw horizon:

Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 2 to 4

Texture—the very channery and extremely channery analogs of loam, silt loam, silty clay loam, or clay loam

C horizon:

Color—hue of 10YR, value of 4 to 6, chroma of 3 or 4

Texture—the very channery and extremely channery analogs of loam or silt loam

Drummer Series*Depth class:* Very deep*Drainage class:* Very poorly drained*Permeability:* Moderate in the subsoil and very rapid in the substratum*Parent material:* Silty material and loamy outwash underlain by gravelly outwash*Landforms:* Outwash plains and outwash terraces*Position on the landform:* Footslopes, open depressions, drainageways*Slope range:* 0 to 2 percent*Adjacent soils:* Miamian, Waynetown, Westland*Taxonomic classification:* Fine-silty, mixed, mesic Typic Haplaquolls**Typical Pedon**

Drummer silty clay loam, gravelly substratum, about 4.5 miles northwest of South Charleston, in Harmony Township; about 1,770 feet south and 1,770 feet east of the northwest corner of sec. 31, T. 6, R. 9:

- Ap—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak very fine and fine granular structure; firm; few fine and medium roots; few pebbles; neutral; clear smooth boundary.
- A—9 to 15 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine and fine subangular blocky structure; firm; few very fine and fine roots; few pebbles; neutral; clear wavy boundary.
- Bg—15 to 22 inches; dark gray (N 4/0) silty clay loam; common medium distinct olive brown (2.5Y 4/4) and few fine distinct light olive brown (2.5Y 5/4) mottles; moderate fine and medium angular blocky structure; firm; few very fine roots; very dark gray (10YR 3/1) organic coatings; few fine dark gray (10YR 4/1) coatings on faces of peds, in pores, and in root channels; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; slightly alkaline; clear wavy boundary.
- Btg—22 to 31 inches; gray (N 5/0) silty clay loam; many medium distinct light olive brown (2.5Y 5/4) mottles; moderate medium prismatic structure parting to moderate fine and medium angular blocky; firm; few very fine roots; many gray (N 5/0) coatings on faces of peds; few fine dark grayish brown (10YR 4/2) clay films on faces of peds, in pores, and in root channels; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; slightly alkaline; gradual wavy boundary.
- B'g—31 to 42 inches; gray (N 5/0) silty clay loam; many medium prominent olive yellow (2.5Y 6/6) and common medium distinct light olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; few fine grayish brown (10YR 5/2) coatings on faces of peds, in pores, and in root channels; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; slightly alkaline; clear wavy boundary.
- 2Bg—42 to 47 inches; grayish brown (2.5Y 5/2) silt loam; common medium prominent olive yellow (2.5Y 6/6) and common medium distinct gray (N 5/0) mottles; weak coarse subangular blocky structure; friable; very dark gray (10YR 3/1) krotovina; black (10YR 2/1) concretions (iron and manganese oxides); about 10 percent soft weathered limestone ghosts; about 12 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.
- 3Cg1—47 to 60 inches; dark gray (N 4/0) gravelly

- loamy sand; single grain; loose; about 25 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.
- 3Cg2—60 to 80 inches; dark gray (N 4/0) very gravelly sand; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

- Thickness of the solum:* 42 to 60 inches
Thickness of the mollic epipedon: 10 to 21 inches
Depth to carbonates: 40 to 65 inches
Thickness of the loess mantle: 40 to 60 inches
Content of rock fragments: 2Bg horizon—5 to 15 percent; 3Cg horizon—15 to 60 percent
- A horizon:*
 Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
 Texture—silty clay loam
- Bg and Btg horizons:*
 Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
 Texture—silty clay loam
- 2Bg horizon:*
 Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
 Texture—silt loam, loam
- 3Cg horizon:*
 Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2
 Texture—the gravelly or very gravelly analogs of loamy sand or sand

Eldean Series

- Depth class:* Very deep
Drainage class: Well drained
Permeability: Moderate or moderately slow in the subsoil and rapid in the substratum
Parent material: Glacial outwash
Landforms: Outwash plains, outwash terraces, kame moraines
Position on the landform: Backslopes, shoulders, summits, micro-highs, risers, treads
Slope range: 0 to 30 percent
Adjacent soils: Lippincott, Miamian, Ockley, Rush
Taxonomic classification: Fine, mixed, mesic Typic Hapludalfs

Typical Pedon

Eldean silt loam, 0 to 2 percent slopes, about 3.5 miles south of New Carlisle, in Bethel Township; about 2,245 feet south of the center of sec. 31, T. 3, R. 9:

- Ap**—0 to 10 inches; dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.
- Bt1**—10 to 17 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common faint yellowish brown (7.5YR 4/4) clay films on faces of peds; about 5 percent gravel; neutral; clear wavy boundary.
- Bt2**—17 to 24 inches; brown (7.5YR 4/4) clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; about 10 percent gravel; neutral; clear wavy boundary.
- Bt3**—24 to 31 inches; brown (7.5YR 4/4) gravelly clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; common distinct carbonate coatings on rock fragments; about 20 percent limestone gravel; neutral; clear wavy boundary.
- 2BC**—31 to 38 inches; brown (7.5YR 4/4) very gravelly loam; weak medium subangular blocky structure; firm; common fine roots; about 55 percent limestone gravel; strongly effervescent; moderately alkaline; clear wavy boundary.
- 2C**—38 to 80 inches; dark yellowish brown (10YR 4/4) extremely gravelly loamy sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Depth to carbonates: 18 to 36 inches

Content of rock fragments: Ap horizon and upper part of Bt horizon—0 to 30 percent; lower part of Bt horizon and BC horizon—10 to 60 percent; C horizon—5 to 70 percent

Ap horizon:

Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 2 to 4

Texture—silt loam, clay loam

Bt horizon:

Color—hue of 7.5YR or 10YR, value of 4 to 6, chroma of 3 to 6

Texture—clay, clay loam, loam, or the gravelly analogs of these textures

2BC horizon:

Color—hue of 10YR or 7.5YR, value of 3 to 6, chroma of 2 to 4

Texture—sandy loam, loam, clay loam, sandy clay

loam, or the gravelly or very gravelly analogs of these textures

2C horizon:

Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4

Texture—stratified gravelly coarse sandy loam to extremely gravelly coarse sand or loamy sand with strata of sand or loamy sand in some pedons

Genesee Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate

Parent material: Alluvium

Landform: Flood plains

Position on the landform: Steps

Slope range: 0 to 2 percent

Adjacent soils: Miamian, Sloan

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

Typical Pedon

Genesee silt loam, till substratum, rarely flooded, about 2.5 miles west of Tremont City, in German Township; about 2,200 feet north and 260 feet west of the southeast corner of sec. 29, T. 4, R. 10:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure; friable; few very fine roots; few pebbles; neutral; abrupt smooth boundary.

Bw1—10 to 18 inches; brown (10YR 4/3) silt loam; weak medium and fine subangular blocky structure; friable; few very fine roots; common distinct dark brown (10YR 3/3) organic coatings on faces of peds; few pebbles; neutral; clear wavy boundary.

Bw2—18 to 25 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; few very fine roots; few pebbles; neutral; clear wavy boundary.

Bw3—25 to 36 inches; brown (10YR 4/3) loam; few medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few very fine roots; few pebbles; slightly effervescent; slightly alkaline; clear wavy boundary.

Bw4—36 to 48 inches; brown (10YR 4/3) loam; common medium distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; few pebbles; slightly

effervescent; slightly alkaline; clear wavy boundary.

C1—48 to 56 inches; dark yellowish brown (10YR 4/4) gravelly loam; common medium distinct yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) mottles; massive; friable; about 20 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

C2—56 to 70 inches; yellowish brown (10YR 5/4) gravelly loamy sand; massive; loose; about 20 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

2C3—70 to 80 inches; dark gray (10YR 4/1) silt loam; massive; very firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Content of rock fragments: C horizon—10 to 30 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam, loam

C horizon:

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

Texture—silt loam, loam, sandy loam, gravelly sandy loam, gravelly loam, gravelly loamy sand

2C horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2

Texture—silt loam, loam

Kokomo Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately slow

Parent material: Glacial till

Landform: Till plains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Adjacent soils: Celina, Crosby, Miamian

Taxonomic classification: Fine, mixed, mesic Typic Argiaquolls

Typical Pedon

Kokomo silty clay loam, about 4 miles south of Springfield, in Greene Township; about 265 feet south

and 265 feet west of the northeast corner of sec. 6, T. 4, R. 8:

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; firm; common fine roots; few pebbles; slightly acid; abrupt smooth boundary.

A—11 to 19 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; common fine roots; few pebbles; slightly acid; clear wavy boundary.

Btg1—19 to 27 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and common medium distinct grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint grayish brown (2.5Y 5/2) clay films on faces of peds; few pebbles; slightly acid; clear wavy boundary.

Btg2—27 to 38 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4 and 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint grayish brown (2.5Y 5/2) clay films on faces of peds; common distinct black (10YR 2/1) coatings on faces of peds (iron and manganese oxides); few pebbles; neutral; clear wavy boundary.

Btg3—38 to 52 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common faint light brownish gray (10YR 6/2) clay films on faces of peds; common distinct black (10YR 2/1) coatings on faces of peds (iron and manganese oxides); few rock fragments; slightly alkaline; clear wavy boundary.

C1—52 to 60 inches; yellowish brown (10YR 5/4) loam; common fine faint yellowish brown (10YR 5/6) and many medium distinct gray (10YR 5/1) mottles; massive; firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—60 to 80 inches; yellowish brown (10YR 5/4) loam; massive; firm; about 5 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 36 to 60 inches

Thickness of the mollic epipedon: 10 to 24 inches

Content of rock fragments: Btg horizon—0 to 5 percent; C horizon—5 to 10 percent

A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2

Texture—silty clay loam

Btg horizon:

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

Texture—silty clay loam or clay loam

C horizon:

Color—hue of 10YR or 2.5Y, value of 5, chroma of 2 to 4

Texture—loam, clay loam

Linwood Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately slow to moderately rapid in the organic material and moderate or moderately slow in the substratum

Parent material: Organic material over silty, loamy, and gravelly deposits

Landforms: Outwash plains and till plains

Position on the landform: Closed depressions

Slope range: 0 to 2 percent

Adjacent soils: Lippincott, Patton, Westland

Taxonomic classification: Loamy, mixed, euic, mesic
Terric Medisaprists

Typical Pedon

Linwood muck, undrained, about 5.5 miles north of Springfield, in Greene Township; about 1,030 feet south and 2,245 feet west of the northeast corner of sec. 27, T. 5, R. 8:

Oa1—0 to 14 inches; muck (sapric material), black (N 2/0) broken face and rubbed; moderate fine granular structure; very friable; many medium and fine roots; about 5 percent fiber, 2 percent rubbed; neutral; clear wavy boundary.

Oa2—14 to 23 inches; sapric material, black (N 2/0) broken face and rubbed; very dark gray (N 3/0) dry; weak coarse and medium subangular blocky structure; friable; common medium and fine roots; few fine shells; about 10 percent fiber, about 5 percent rubbed; neutral; clear wavy boundary.

Oa3—23 to 36 inches; sapric material, black (10YR 2/1) broken face and rubbed (sedimentary peat); very dark gray (10YR 3/1) dry; weak thick platy structure; friable; few fine roots; about 40 percent

fiber, about 10 percent rubbed; neutral; clear wavy boundary.

2Cg1—36 to 40 inches; gray (N 5/0) silt loam; massive; friable; few fine shells; few plant fibers; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg2—40 to 48 inches; dark gray (N 4/0) silt loam; massive; friable; few fine shells; few plant fibers; strongly effervescent; moderately alkaline; gradual wavy boundary.

2Cg3—48 to 80 inches; dark gray (N 4/0) silt loam; massive; friable; coatings in vertical partings; few pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the organic material: 16 to 51 inches

Depth to carbonates: 20 to 60 inches

Content of rock fragments: 2Cg horizon—0 to 15 percent

Surface tier:

Color—hue of 2.5Y, 10YR, or neutral, value of 2, chroma of 0 to 2

Texture—muck, mucky silt loam

Subsurface tier:

Color—hue of 2.5Y, 10YR, or neutral, value of 2 or 3, chroma of 0 to 3

Texture—sapric material

2Cg horizon:

Color—hue of 10YR, 2.5Y, or neutral, value of 4 to 6, chroma of 0 to 2

Texture—silt loam, silty clay loam, loam; thin strata of gravelly loamy sand in the lower part in some pedons

3Cg horizon (if it occurs):

Color—hue of 10YR, 2.5Y, or neutral, value of 4 or 5, chroma of 1 or 2

Texture—the gravelly analogs of loamy coarse sand or coarse sandy loam

Lippincott Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderate in the subsoil and rapid in the substratum

Parent material: Glacial outwash

Landforms: Outwash plains and valley trains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Savona

Taxonomic classification: Fine, mixed, mesic Typic Argiaquolls

Typical Pedon

Lippincott silty clay loam, about 2 miles southeast of Tremont City, in Moorefield Township; about 1,350 feet south and 520 feet east of the northwest corner of sec. 33, T. 5, R. 10:

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; few fine roots; few pebbles; slightly acid; abrupt smooth boundary.

A—7 to 13 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; common fine distinct strong brown (7.5YR 5/6) mottles in the lower part of the horizon; moderate medium subangular blocky structure; firm; few fine roots; few pebbles; slightly acid; clear wavy boundary.

Btg1—13 to 17 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/4) mottles; moderate fine and medium prismatic structure parting to moderate medium subangular blocky; very firm; many faint dark brown (7.5YR 4/2) clay films on faces of peds; common black (10YR 2/1) krotovinas; neutral; clear wavy boundary.

Btg2—17 to 23 inches; gray (10YR 5/1) clay; common medium prominent strong brown (7.5YR 5/6) and common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; very firm; common faint gray (10YR 5/1) clay films on faces of peds; common black (10YR 2/1) krotovinas; slightly alkaline; clear wavy boundary.

Btg3—23 to 27 inches; gray (10YR 5/1) clay loam; common medium prominent strong brown (7.5YR 5/6) and common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; few faint gray (10YR 5/1) clay films on faces of peds; few black (10YR 2/1) krotovinas; slightly alkaline; clear wavy boundary.

2BCg—27 to 34 inches; grayish brown (10YR 5/2) gravelly silt loam; common medium distinct brown (7.5YR 5/2) mottles; weak coarse subangular blocky structure; friable; about 25 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

2C—34 to 80 inches; brown (10YR 5/3) very gravelly loamy coarse sand; single grain; loose; about 55 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 25 to 40 inches

Thickness of the mollic epipedon: 10 to 20 inches

Depth to carbonates: 20 to 40 inches

Content of rock fragments: A horizon—0 to 10 percent; Btg horizon—0 to 10 percent; 2BC horizon—15 to 60 percent; 2C horizon—35 to 70 percent

A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2

Texture—silty clay loam, clay loam, mucky silt loam

Btg horizon:

Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 or 2

Texture—clay loam, silty clay loam, clay, silty clay

2BC horizon:

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

Texture—the gravelly or very gravelly analogs of loam, silt loam, or sandy loam

2C horizon:

Color—hue of 10YR or 2.5Y, value of 4 to 6, chroma of 1 to 3

Texture—the very gravelly or extremely gravelly analogs of sandy loam, sand, loamy sand, or loamy coarse sand

Miamian Series

Depth class: Very deep and deep

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till and a thin layer of loess in places

Landforms: Till plains, kame terraces

Position on the landform: Backslopes, shoulders, summits, micro-highs

Slope range: 0 to 30 percent

Adjacent soils: Celina, Crosby, Kokomo

Taxonomic classification: Fine, mixed, mesic Typic Hapludalfs

Typical Pedon

Miamian silt loam, 2 to 6 percent slopes, about 3.5 miles south of Springfield, in Springfield Township; about 330 feet north and 840 feet east of the center of sec. 31, T. 5, R. 9:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; moderate fine granular structure; friable; common roots; neutral; abrupt smooth boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/4) silty

clay loam; moderate medium subangular blocky structure; friable; common roots; common faint brown (10YR 4/3) clay films on faces of peds; neutral; clear wavy boundary.

Bt2—14 to 20 inches; dark yellowish brown (10YR 4/4) clay; moderate medium subangular blocky structure; firm; common roots; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few rock fragments; neutral; clear wavy boundary.

Bt3—20 to 30 inches; dark yellowish brown (10YR 4/4) clay; moderate medium subangular blocky structure; firm; few roots; many faint dark yellowish brown (10YR 4/4) clay films on faces of peds; common distinct black (10YR 2/1) coatings (iron and manganese oxides) on faces of peds; about 5 percent rock fragments; neutral; clear wavy boundary.

Bt4—30 to 36 inches; yellowish brown (10YR 5/4) clay; moderate medium subangular blocky structure; firm; many faint yellowish brown (10YR 5/4) clay films on faces of peds; 5 percent rock fragments; slightly alkaline; clear wavy boundary.

C—36 to 80 inches; yellowish brown (10YR 5/4) loam; massive; very firm; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Depth to bedrock: 40 to 80 inches

Depth to carbonates: 18 to 40 inches

Thickness of the loess mantle: 0 to 18 inches

Content of rock fragments: Bt horizon—1 to 10 percent; C horizon—2 to 15 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam, silty clay loam, clay loam

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6

Texture—clay, clay loam, or silty clay loam

C horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4

Texture—silt loam or loam

Milford Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately slow in the solum and

moderately rapid in the substratum

Parent material: Stratified silty and clayey sediments underlain by sand and gravel

Landform: Lake plains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Adjacent soils: Miamian

Taxonomic classification: Fine, mixed, mesic Typic Haplaquolls

Typical Pedon

Milford silty clay loam, sandy substratum, about 2 miles east of Selma, in Madison Township; about 1,120 feet north of the intersection of London Road and Wildman Road along Wildman Road, then 3,100 feet east:

Ap—0 to 10 inches; black (N 2/0) silty clay loam, very dark grayish brown (10YR 3/2) dry; moderate medium granular structure; friable; few fine roots; slightly alkaline; abrupt smooth boundary.

A—10 to 18 inches; black (10YR 2/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; few fine faint very dark grayish brown (10YR 3/2) mottles; moderate medium angular blocky structure; firm; few fine roots; slightly alkaline; clear wavy boundary.

Bg1—18 to 22 inches; very dark gray (10YR 3/1) silty clay; few fine faint grayish brown (10YR 5/2) mottles; moderate fine and medium angular blocky structure; firm; common fine roots; thin faint very dark gray (10YR 3/1) coatings on pressure faces on peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Bg2—22 to 30 inches; dark grayish brown (2.5Y 4/2) silty clay; common medium prominent brown (7.5YR 5/4) and common medium distinct dark gray (N 4/0) mottles; moderate medium angular blocky structure; firm; thin faint very dark gray (10YR 3/1) coatings on pressure faces on peds; common black (10YR 2/1) krotovinas; few fine black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Bg3—30 to 42 inches; gray (N 6/0) silty clay; common medium prominent olive yellow (2.5Y 6/6) mottles; moderate medium prismatic structure parting to weak coarse angular blocky; firm; common fine roots; common black (10YR 2/1) krotovinas; neutral; clear wavy boundary.

Bg4—42 to 55 inches; gray (N 5/0) silty clay loam; many coarse prominent olive (5Y 5/6) mottles; weak medium prismatic structure; firm; slightly

effervescent in the lower part; slightly alkaline; clear wavy boundary.

2Cg—55 to 64 inches; grayish brown (2.5Y 5/2) loam; many coarse distinct light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure; firm; about 5 percent gravel; slightly effervescent; moderately alkaline; clear wavy boundary.

2C1—64 to 75 inches; brown (10YR 5/3) loamy coarse sand; single grain; loose; strongly effervescent; moderately alkaline; clear wavy boundary.

3C2—75 to 80 inches; brown (10YR 5/3) gravelly loamy coarse sand; single grain; loose; about 25 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Thickness of the mollic epipedon: 12 to 24 inches

Depth to carbonates: 40 to 55 inches

Content of rock fragments: 2C horizon—5 to 35 percent

A horizon:

Color—hue of 10YR, 2.5Y, or neutral, value of 2 or 3, chroma of 0 to 2

Texture—silty clay loam

Bg horizon:

Color—hue of 10YR, 2.5Y, or neutral, value of 3 to 6, chroma of 0 to 2

Texture—silty clay, silty clay loam, clay loam

2Cg, 2C, and 3C horizons:

Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4

Texture—loam, loamy coarse sand, gravelly loamy coarse sand

Millsdale Series

Depth class: Moderately deep

Drainage class: Very poorly drained

Permeability: Moderately slow

Parent material: Glacial till and, in some pedons, the underlying residuum derived from limestone or dolomite

Landforms: Till plains and stream terraces

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Adjacent soils: Crosby, Kokomo, Miamian, Milton

Taxonomic classification: Fine, mixed, mesic Typic Argiaquolls

Typical Pedon

Millsdale silty clay loam, about 3.6 miles east of Enon, in Mad River Township; about 1,665 feet south and 2,530 feet west of the northeast corner of sec. 13, T. 4, R. 9:

Ap1—0 to 6 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many medium and fine roots; neutral; clear wavy boundary.

Ap2—6 to 12 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; common fine prominent light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; firm; many medium and fine roots; neutral; gradual wavy boundary.

Btg1—12 to 17 inches; very dark gray (N 3/0) silty clay, dark gray (10YR 4/1) dry; few fine distinct very dark grayish brown (2.5Y 3/2) and common medium distinct dark grayish brown (2.5Y 4/2) mottles; moderate medium subangular blocky structure; firm; common medium and fine roots; few faint very dark gray (10YR 3/1) clay films on faces of peds; many continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few faint black (N 2/0) concretions (iron and manganese oxides); common black (10YR 2/1) krotovinas; neutral; gradual wavy boundary.

Btg2—17 to 29 inches; dark gray (N 4/0) silty clay; common medium distinct olive brown (2.5Y 4/4) and few medium prominent light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; common medium and fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; few distinct black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Btg3—29 to 34 inches; gray (N 6/0) silty clay loam; many coarse prominent light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; few grayish brown (10YR 5/2) clay films on vertical faces of peds; neutral; abrupt smooth boundary.

2R—34 to 37 inches; dolomite.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Thickness of the mollic epipedon: 10 to 18 inches

Depth to bedrock: 20 to 40 inches

Content of rock fragments: A horizon—0 to 10 percent; Btg horizon—0 to 10 percent

A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2

Texture—silty clay loam

Btg horizon:

Color—hue of 10YR to 5Y or neutral, value of 3 to 7, chroma of 0 to 4

Texture—silty clay loam, silty clay, clay loam

Milton Series

Depth class: Moderately deep

Drainage class: Well drained

Permeability: Moderate or moderately slow

Parent material: Glacial till and, in some pedons, the underlying residuum derived from limestone or dolomite

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits, micro-highs

Slope range: 0 to 6 percent

Adjacent soils: Miamian, Millsdale, Randolph

Taxonomic classification: Fine, mixed, mesic Typic Hapludalfs

Typical Pedon

Milton silt loam, 2 to 6 percent slopes, about 0.5 mile east of Enon, in Mad River Township; about 475 feet east and 975 feet north of the center of sec. 31, T. 4, R. 9:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; common fine roots; common faint dark brown (10YR 3/3) coatings on faces of peds; few rock fragments; neutral; abrupt smooth boundary.

Bt1—9 to 13 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few rock fragments; neutral; clear wavy boundary.

Bt2—13 to 23 inches; brown (7.5YR 4/4) clay; moderate medium subangular blocky structure; firm; common fine roots; common faint brown (7.5YR 4/4) clay films on faces of peds; few rock fragments, mostly dolomite; neutral; clear wavy boundary.

Bt3—23 to 31 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common distinct brown (7.5YR 5/2) clay films on faces of peds; about 5

percent rock fragments, mostly dolomite; neutral; abrupt smooth boundary.

2R—31 to 34 inches; dolomite.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Depth to bedrock: 20 to 40 inches

Content of rock fragments: A horizon—0 to 5 percent; Bt horizon—0 to 10 percent; 2Bt horizon—10 to 50 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 to 6

Texture—silty clay loam, clay loam, silty clay, clay

Ockley Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate in the solum and very rapid in the substratum

Parent material: Silty material, loamy outwash, and stratified sandy and gravelly outwash

Landforms: Outwash plains and stream terraces

Position on the landform: Footslopes, backslopes, shoulders, summits, micro-highs, treads

Slope range: 0 to 6 percent

Adjacent soils: Eldean, Lippincott, Westland

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

Typical Pedon

Ockley silt loam, 2 to 6 percent slopes, about 4.3 miles west of South Charleston, in Greene Township; about 160 feet west and 130 feet south of the northeast corner of sec. 5, T. 5, R. 8:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; common fine and very fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; common distinct brown (10YR 4/3) coatings on faces of peds; very strongly acid; gradual wavy boundary.

2Bt2—15 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct brown (10YR 4/3) coatings on faces of peds; very strongly acid; few pebbles; clear wavy boundary.

2Bt3—22 to 27 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine and very fine roots; common distinct brown (7.5YR 4/3) clay films on faces of peds; few pebbles; very strongly acid; clear wavy boundary.

2Bt4—27 to 36 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common distinct dark brown (7.5YR 4/3) clay films on faces of peds; few distinct dark brown (7.5YR 4/4) coatings on faces of peds; few pebbles; very strongly acid; gradual wavy boundary.

2Bt5—36 to 45 inches; dark brown (7.5YR 4/4) loam; weak coarse subangular blocky structure; very friable; few very fine roots; few pebbles; slightly acid; clear wavy boundary.

2Bt6—45 to 49 inches; dark brown (7.5YR 4/2) gravelly sandy clay loam; weak coarse subangular blocky structure; friable; few very fine roots; common distinct dark brown (7.5YR 3/2) clay films bridging sand grains; about 15 percent gravel; tongues extending 4 to 10 inches into the gravelly coarse sand and coarse sand; neutral; clear irregular boundary.

3C—49 to 80 inches; yellowish brown (10YR 5/4), stratified gravelly coarse sand and coarse sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 72 inches

Depth to carbonates: 40 to 72 inches

Thickness of the loess mantle: 0 to 20 inches

Content of rock fragments: Bt horizon—0 to 10 percent; 2Bt horizon—10 to 45 percent; 3C horizon—5 to 35 percent

Ap horizon:

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

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 4 to 6
Texture—silt loam, silty clay loam

2Bt horizon:

Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 to 4

Texture—clay loam, loam, sandy clay loam, or the gravelly analogs of these textures

3C horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4

Texture—sand, coarse sand, loamy coarse sand, gravelly sand, gravelly coarse sand, very gravelly loamy coarse sand

Patton Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderately slow

Parent material: Lacustrine sediments

Landform: Lake plains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Adjacent soils: Miamian, Ockley

Taxonomic classification: Fine-silty, mixed, mesic Typic Haplaquolls

Typical Pedon

Patton silty clay loam, about 4 miles south of Springfield, in Springfield Township; about 1,870 feet south and 10 feet east of the center of sec. 25, T. 5, R. 9:

Ap1—0 to 5 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium and fine granular structure; friable; few fine and very fine roots; neutral; clear smooth boundary.

Ap2—5 to 12 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium angular blocky structure; firm; few fine and very fine roots; neutral; clear wavy boundary.

Bg1—12 to 15 inches; dark gray (N 4/0) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and common medium faint gray (N 5/0) mottles; moderate coarse and medium prismatic structure parting to weak medium angular blocky; firm; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bg2—15 to 22 inches; gray (N 5/0) silty clay loam; common medium distinct grayish brown (2.5Y 5/2) and common medium prominent light olive brown (2.5Y 5/4) mottles; moderate medium prismatic

structure parting to weak coarse angular blocky; firm; few very fine roots; common distinct dark gray (N 4/0) organic coatings on faces of peds; neutral; gradual wavy boundary.

BCg—22 to 36 inches; gray (5Y 5/1) silt loam; common medium distinct light olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure; firm; few very fine roots; slightly effervescent in the lower part; slightly alkaline; gradual wavy boundary.

Cg1—36 to 65 inches; gray (N 5/0) silt loam with thin strata of loam; common medium distinct light olive brown (2.5Y 5/4) mottles; massive; firm; slightly effervescent; moderately alkaline; gradual wavy boundary.

Cg2—65 to 75 inches; dark gray (N 4/0) loam stratified with light olive brown (2.5Y 5/4) silt loam; massive; friable; slightly effervescent; moderately alkaline; clear wavy boundary.

Cg3—75 to 80 inches; dark gray (N 4/0) silt loam; massive; firm; slightly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 48 inches

Thickness of the mollic epipedon: 10 to 20 inches

Ap or A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2

Texture—silty clay loam

Bg horizon:

Texture—silt loam, silty clay loam

Cg horizon:

Color—hue of 10YR, 2.5Y, or neutral, value of 4 or 5, chroma of 0 to 2

Texture—silt loam, silty clay loam, thin subhorizons of loam and fine sandy loam

Randolph Series

Depth class: Moderately deep

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Glacial till and, in some pedons, the underlying residuum derived from limestone or dolomite

Landform: Till plains

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 2 percent

Adjacent soils: Celina, Crosby, Millsdale, Milton
Taxonomic classification: Fine, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Randolph silt loam, 0 to 2 percent slopes, about 2.7 miles northeast of New Carlisle, in Pike Township; about 1,564 feet south and 725 feet west of the center of sec. 18, R. 9, T. 3:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; common fine roots; few rock fragments; neutral; abrupt smooth boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint grayish brown (10YR 5/2) and few medium distinct dark yellowish brown (10YR 4/4) mottles; moderate medium and fine subangular blocky structure; firm; common fine roots; few distinct brown (10YR 4/3) coatings in worm channels; few fine black (10YR 2/1) stains (iron and manganese oxides); few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; many distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few rock fragments; slightly acid; clear wavy boundary.

Bt2—14 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; moderate medium and fine subangular blocky structure; firm; few fine roots; few distinct brown (10YR 4/3) coatings in worm channels; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few rock fragments; slightly acid; clear wavy boundary.

Bt3—19 to 25 inches; brown (10YR 4/3) clay; common medium distinct grayish brown (10YR 5/2) and few medium distinct yellowish brown (10YR 5/4) mottles; weak medium and fine subangular blocky structure; firm; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 5 percent rock fragments; neutral; abrupt wavy boundary.

2R—25 to 28 inches; dolomite.

Range in Characteristics

Thickness of the solum: 20 to 40 inches

Depth to bedrock: 20 to 40 inches

Content of rock fragments: Ap horizon—0 to 2 percent; Bt horizon—0 to 10 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 1 to 3
Texture—silt loam

Bt horizon:

Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 3 or 4
Texture—clay, silty clay, silty clay loam, clay loam

Rodman Series

Depth class: Very deep

Drainage class: Excessively drained

Permeability: Moderately rapid in the subsoil and very rapid in the substratum

Parent material: Stratified gravelly and sandy outwash

Landform: Kame moraines

Position on the landform: Backslopes

Slope range: 18 to 35 percent

Adjacent soils: Eldean, Lippincott, Miamian

Taxonomic classification: Sandy-skeletal, mixed, mesic
Typic Hapludolls

Typical Pedon

Rodman gravelly loam, 18 to 35 percent slopes, about 2 miles southwest of Catawba, in Pleasant Township; about 1,610 feet north and 400 feet west of the center of sec. 27, T. 6, R. 10:

A—0 to 7 inches; very dark grayish brown (10YR 3/2) gravelly loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; common fine roots; about 25 percent gravel, mostly limestone; slightly effervescent; moderately alkaline; clear wavy boundary.

Bw—7 to 12 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine granular structure; very friable; common fine roots; about 30 percent gravel, mostly limestone; slightly effervescent; moderately alkaline; clear wavy boundary.

C—12 to 80 inches; yellowish brown (10YR 5/4) extremely gravelly sand stratified with very gravelly coarse sand; single grain; loose; few fine roots in the upper 6 inches of the horizon; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 10 to 15 inches

Depth to carbonates: 10 to 15 inches

Content of rock fragments: A horizon—10 to 25 percent; Bw horizon—10 to 30 percent; C horizon—35 to 70 percent

A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—gravelly loam

Bw horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4
Texture—loam, sandy loam, or the gravelly and very gravelly analogs of these textures

C horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4
Texture—sand, coarse sand, or the gravelly to extremely gravelly analogs of these textures

Ross Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate

Parent material: Alluvium

Landforms: Flood plains and low terraces

Position on the landform: Steps of flood plains, terrace treads

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Lippincott, Tremont

Taxonomic classification: Fine-loamy, mixed, mesic
Cumulic Hapludolls

Typical Pedon

Ross silty clay loam, rarely flooded, about 1 mile northwest of Enon, in Bethel Township; about 475 feet north and 1,190 feet west of the southeast corner of sec. 8, T. 3, R. 9:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; common fine and very fine roots; few pebbles; slightly effervescent; slightly alkaline; abrupt smooth boundary.

A—10 to 27 inches; very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium and fine granular structure; friable; few fine and very fine roots; few pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

Bw—27 to 34 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium and fine granular structure; friable; few fine and very fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of

- pedes; about 5 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.
- C1—34 to 50 inches; brown (10YR 4/3) loam; massive; friable; few very fine roots; about 5 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.
- C2—50 to 72 inches; brown (10YR 4/3) gravelly sandy loam with thin strata of silty clay loam; massive; friable; about 20 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.
- C3—72 to 80 inches; dark yellowish brown (10YR 4/4) very gravelly coarse sandy loam; loose; single grain; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 45 inches

Thickness of the mollic epipedon: 24 to 40 inches

Content of coarse fragments: A horizon—0 to 8 percent; Bw horizon—0 to 10 percent; C horizon—0 to 45 percent

Ap or A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3

Texture—silt loam, silty clay loam

Bw horizon:

Color—hue of 10YR, value of 3 or 4, chroma of 2 to 4

Texture—silt loam, loam

C horizon:

Color—hue of 10YR, value of 4 to 6, chroma of 2 to 4

Texture—silt loam, loam, sandy loam, coarse sandy loam, or the gravelly or very gravelly analogs of these textures

Rush Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate in the solum and very rapid in the substratum

Parent material: Silty material underlain by loamy and gravelly outwash

Landforms: Outwash plains and outwash terraces

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Waupecan

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

Typical Pedon

Rush silt loam, 0 to 2 percent slopes, about 0.5 mile east of New Moorefield, in Moorefield Township; about 1,320 feet west and 525 feet north of the southeast corner of sec. 4, T. 5, R. 10:

Ap—0 to 13 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—13 to 23 inches; yellowish brown (10YR 5/4) silt loam; moderate fine subangular blocky structure; friable; common fine roots; common faint yellowish brown (10YR 5/4) clay films on faces of pedes; moderately acid; clear wavy boundary.

Bt2—23 to 31 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common faint brown (10YR 4/4) clay films on faces of pedes; strongly acid; clear wavy boundary.

Bt3—31 to 39 inches; brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common faint brown (10YR 4/4) clay films on faces of pedes; very strongly acid; clear wavy boundary.

2Bt4—39 to 46 inches; strong brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; common faint brown (7.5YR 4/4) clay films on faces of pedes; slightly acid; about 10 percent gravel; clear wavy boundary.

3BC—46 to 58 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; weak medium subangular blocky structure; friable; about 40 percent gravel; strongly effervescent; slightly alkaline; clear wavy boundary.

3C—58 to 80 inches; brown (10YR 5/3) very gravelly loamy coarse sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 55 to 80 inches

Thickness of the loess mantle: 24 to 40 inches

Content of rock fragments: Bt horizon—0 to 15 percent; 2Bt horizon—10 to 30 percent; 3BC horizon—25 to 60 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 4 to 6

Texture—silt loam, silty clay loam

2Bt horizon:

Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 3 to 6

Texture—loam, clay loam, sandy clay loam

3BC horizon:

Color—hue of 7.5YR or 10YR, value of 4 or 5, chroma of 4 to 6

Texture—the gravelly or very gravelly analogs of sandy loam, coarse sandy loam, or loamy coarse sand

3C horizon:

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

Texture—the gravelly to extremely gravelly analogs of loamy coarse sand or coarse sand

Savona Series

Depth class: Very deep

Drainage class: Somewhat poorly drained

Permeability: Moderate or moderately slow in the solum and rapid in the underlying material

Parent material: Gravelly and sandy outwash

Landform: Outwash terraces

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Lippincott

Taxonomic classification: Fine, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Savona silt loam, 0 to 2 percent slopes, about 1.3 miles east of Tremont City, in German Township; about 345 feet north and 1,715 feet west of the southeast corner of sec. 5, T. 4, R. 10:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine and very fine granular structure; friable; few fine and very fine roots; few pebbles; strongly acid; abrupt wavy boundary.

BE—10 to 13 inches; yellowish brown (10YR 5/4) silt loam; common medium faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate fine and very fine subangular blocky structure; friable; few fine and very fine roots; many faint brown (10YR 5/3) and few distinct light brownish gray (10YR 6/2) silt coatings on faces of peds; few pebbles; strongly acid; clear wavy boundary.

Bt1—13 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown

(10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct brown (10YR 4/3) silt coatings on faces of peds; few pebbles; strongly acid; clear wavy boundary.

Bt2—18 to 26 inches; yellowish brown (10YR 5/4) clay; common medium faint yellowish brown (10YR 5/6) and common medium distinct grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; many distinct grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) clay films on faces of peds; few dark grayish brown (10YR 4/2) silt coatings on faces of peds; about 5 percent gravel; slightly acid; clear wavy boundary.

Bt3—26 to 36 inches; dark grayish brown (10YR 4/2) gravelly clay; common medium faint grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine and very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 20 percent gravel; neutral; clear wavy boundary.

BC1—36 to 39 inches; dark grayish brown (10YR 4/2) gravelly silt loam; common medium faint brown (10YR 4/3) and common medium distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few fine and very fine roots; about 35 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

BC2—39 to 47 inches; grayish brown (10YR 5/2) very gravelly sandy loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure parting to moderate medium and fine granular; very friable; few very fine roots; about 40 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1—47 to 68 inches; stratified grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) extremely gravelly loamy coarse sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—68 to 80 inches; yellowish brown (10YR 5/4) extremely gravelly coarse sand; single grain; loose; about 70 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 30 to 55 inches

Depth to carbonates: 24 to 40 inches

Content of rock fragments: A horizon—0 to 5 percent; upper part of Bt horizon—0 to 15 percent; lower part of Bt horizon—15 to 35 percent; BC horizon—15 to 60 percent; C horizon—35 to 75 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam

Bt or Btg horizon:

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

Texture—clay, clay loam, silty clay loam in the upper part; the gravelly analogs of clay, clay loam, sandy clay loam, or loam in the lower part

C horizon:

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

Texture—the very gravelly or extremely gravelly analogs of loamy sand, sand, loamy coarse sand, or coarse sand

Sloan Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderate or moderately slow in the solum and rapid in the substratum

Parent material: Alluvium

Landform: Flood plains

Position on the landform: Steps

Slope range: 0 to 2 percent slopes

Adjacent soils: Lippincott, Ross

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

Typical Pedon

Sloan silt loam, sandy substratum, occasionally flooded, about 1.3 miles east of Clifton, in Greene Township; about 265 feet west and 1,425 feet south of the northeast corner of sec. 26, T. 5, R. 8:

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium and fine granular structure; friable; many fine roots; neutral; clear wavy boundary.

A—10 to 17 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; common fine roots; slightly alkaline; gradual wavy boundary.

Bg1—17 to 23 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; friable; common fine roots; few fine black (10YR 2/1) concretions (iron

and manganese oxides); slightly alkaline; clear wavy boundary.

Bg2—23 to 31 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine prominent olive brown (2.5Y 4/4) mottles; weak medium subangular blocky structure; firm; few fine black (10YR 2/1) concretions (iron and manganese oxides); slightly alkaline; clear wavy boundary.

C—31 to 40 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium faint light olive brown (2.5Y 5/6) and common medium distinct light gray (N 6/0) mottles; massive; friable; slightly alkaline; clear wavy boundary.

Cg1—40 to 48 inches; gray (N 5/0) silt loam; many coarse distinct olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/6) mottles; massive; friable; slightly alkaline; clear wavy boundary.

Cg2—48 to 56 inches; dark gray (N 4/0) silt loam; massive; friable; few shell fragments; about 5 percent gravel; slightly alkaline; clear wavy boundary.

Cg3—56 to 80 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand stratified with very gravelly loamy coarse sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 55 inches

Thickness of the mollic epipedon: 10 to 24 inches

Depth to carbonates: 22 to 60 inches

Content of rock fragments: A horizon—0 to 5 percent; B horizon—0 to 5 percent; C horizon—0 to 35 percent

A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2

Texture—silt loam

Bg horizon:

Color—hue of 10YR or 2.5Y, value of 2 to 5, chroma of 1 or 2

Texture—silty clay loam, clay loam

C horizon:

Color—hue of 10YR, 2.5Y, or neutral, value of 4 or 5, chroma of 0 to 3

Texture—silt loam, gravelly loamy coarse sand, very gravelly loamy coarse sand

Strawn Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits, micro-highs

Slope range: 0 to 35 percent

Adjacent soils: Celina, Crosby, Kokomo, Miamian

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

Typical Pedon

Strawn silty clay loam, in an area of Celina-Strawn complex, 2 to 6 percent slopes, about 3 miles east of South Charleston, in Madison Township; about 1,850 feet west of the intersection of Huntington Road and Correll-Maxey Road (Township Road 57 in Madison County), along Huntington Road, then 260 feet south:

Ap—0 to 10 inches; brown (10YR 4/3) silty clay loam, pale brown (10YR 6/3) dry; about 30 percent dark yellowish brown (10YR 4/4) material mixed from the subsoil; weak coarse subangular blocky structure; firm; few fine and very fine roots; few rock fragments; neutral; clear wavy boundary.

Bt—10 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few light gray (10YR 7/2), soft weathered limestone fragments; few rock fragments; slightly alkaline; gradual wavy boundary.

BC—16 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; few medium distinct yellowish brown (10YR 5/4) mottles; weak coarse and medium subangular blocky structure; firm; few fine and very fine roots; few faint brown (10YR 4/3) clay films on faces of peds; common distinct grayish brown (10YR 5/2) coatings of secondary lime on faces of peds; few rock fragments; slightly effervescent; slightly alkaline; gradual wavy boundary.

C1—23 to 52 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; very firm; few very fine roots in the upper part; common distinct light brownish gray (10YR 6/2) coatings of lime in vertical partings; few rock fragments; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—52 to 80 inches; yellowish brown (10YR 5/4) clay loam; few distinct yellowish brown (10YR 5/6) mottles; massive; firm; common distinct light brownish gray (10YR 6/2) coatings of lime in vertical partings; about 10 percent rock fragments; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 16 to 24 inches

Depth to carbonates: 14 to 24 inches

Ap horizon:

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

Texture—silt loam, silty clay loam

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4

Texture—silty clay loam, clay loam

BC horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 or 4

Texture—silty clay loam, clay loam

C horizon:

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

Texture—silt loam, loam, clay loam

Thackery Series

Depth class: Very deep

Drainage class: Moderately well drained

Permeability: Moderate in the upper part and rapid in the lower part

Parent material: Silty material or loess over outwash

Landforms: Outwash plains and outwash terraces

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 2 percent

Adjacent soils: Miamian, Westland

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

Typical Pedon

Thackery silt loam, 0 to 2 percent slopes, about 3.5 miles west of South Charleston, in Madison Township; about 2,110 feet west and 1,295 feet south of the northeast corner of sec. 35, T. 6, R. 8:

Ap—0 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); moderately acid; abrupt wavy boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine and medium subangular blocky structure; firm; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); many fine brown (10YR 5/3) silt coatings on faces of peds; few fine dark

yellowish brown (10YR 4/4) clay films on faces of peds and in root channels; few pebbles; slightly acid; clear wavy boundary.

2Bt2—16 to 25 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); common fine brown (10YR 4/3) clay films in channels and on faces of peds; few pebbles; slightly acid; clear wavy boundary.

2Bt3—25 to 36 inches; brown (10YR 4/3) sandy clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium and coarse subangular blocky structure; firm; few very fine and fine roots; few black (N 2/0) stains (iron and manganese oxides); few medium distinct brown (10YR 4/3) clay films in pores and channels and on faces of peds; about 5 percent gravel; neutral; clear wavy boundary.

2BC—36 to 53 inches; brown (10YR 5/3) very gravelly sandy loam; weak medium granular structure; very friable; about 50 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

2C—53 to 80 inches; grayish brown (10YR 5/2) gravelly sand; single grain; loose; about 30 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Depth to carbonates: 32 to 55 inches

Thickness of the loess mantle: 0 to 30 inches

Content of rock fragments: 2Bt horizon—2 to 25 percent; 2BC and 2C horizons—15 to 70 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam

Bt horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6

Texture—silt loam, silty clay loam

2Bt horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6

Texture—clay loam, sandy clay loam, gravelly clay loam

2C horizon:

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

Texture—sand, loamy sand, loamy coarse sand, or the gravelly to extremely gravelly analogs of these textures

Tremont Series

Depth class: Very deep

Drainage class: Moderately well drained

Permeability: Moderate

Parent material: Alluvium

Landform: Flood plains

Position on the landform: Steps

Slope range: 0 to 2 percent

Adjacent soils: Lippincott, Ross, Sloan

Taxonomic classification: Fine-loamy, mixed (calcareous), mesic Cumulic Haplaquolls

Typical Pedon

Tremont silty clay loam, rarely flooded, about 2 miles west of Enon, in Mad River Township; about 130 feet north and 460 feet west of the southeast corner of sec. 13, T. 3, R. 9:

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam, very dark grayish brown (10YR 3/2) dry; firm; few medium and fine roots; few pebbles; slightly effervescent; moderately alkaline; abrupt wavy boundary.

A—7 to 13 inches; very dark gray (10YR 3/1) clay loam, very dark grayish brown (10YR 3/2) dry; weak coarse and medium subangular blocky structure; firm; few medium and fine roots; few pebbles; slightly effervescent; moderately alkaline; abrupt wavy boundary.

Ab1—13 to 21 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; weak fine and very fine granular structure; friable; few medium and fine roots; few pebbles; slightly effervescent; slightly alkaline; clear wavy boundary.

Ab2—21 to 29 inches; very dark gray (10YR 3/1) loam, very dark grayish brown (10YR 3/2) dry; weak medium prismatic structure parting to moderate medium and fine subangular blocky; firm; few medium and fine roots; few pebbles; slightly effervescent; moderately alkaline; clear wavy boundary.

Bgb1—29 to 37 inches; dark gray (10YR 4/1) loam; common medium prominent olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) mottles; moderate medium and fine subangular blocky structure; firm; about 5 percent gravel; few black (10YR 2/1) krotovinas; slightly effervescent; moderately alkaline; clear wavy boundary.

- Bgb2—37 to 54 inches; gray (10YR 5/1) clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; firm; about 5 percent gravel; few black (10YR 2/1) krotovinas; slightly effervescent; slightly alkaline; clear wavy boundary.
- 2Cg1—54 to 64 inches; dark grayish brown (10YR 4/2) gravelly loam; single grain; loose; about 15 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.
- 2Cg2—64 to 80 inches; dark gray (10YR 4/1) very gravelly coarse sandy loam; single grain; loose; about 40 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 72 inches

Thickness of the mollic epipedon: 24 to 36 inches

Content of rock fragments: A horizon—0 to 5 percent;
C or Cg horizon—0 to 10 percent; 2C or 2Cg horizon—15 to 60 percent

Ap and A horizons:

Color—hue of 10YR, value of 3 (4 or 5 dry),
chroma of 1 to 3

Texture—silt loam, silty clay loam, clay loam

Ab horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1
or 2

Texture—clay loam, silty clay loam, silt loam, loam

Bgb horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 1
or 2

Texture—clay loam, silty clay loam, silt loam, loam

Cg or C horizon (if it occurs):

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

Texture—clay loam, silty clay loam, silt loam,
loam, and subhorizons of sandy loam or coarse
sandy loam

2Cg or 2C horizon:

Color—hue of 10YR, 2.5Y, or neutral, value of 4 to
6, chroma of 0 to 4

Texture—the gravelly or very gravelly analogs of
silt loam, loam, sandy loam, or coarse sandy
loam; subhorizons of gravelly or very gravelly
loamy sand

Walkill Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderate over moderately rapid or rapid

Parent material: Alluvium over organic soil material
and the underlying loamy and gravelly material

Landform: Flood plains

Position on the landform: Steps

Slope range: 0 to 2 percent

Adjacent soils: Carlisle, Drummer

Taxonomic classification: Fine-loamy, mixed, nonacid,
mesic Thapto-Histic Fluvaquents

Typical Pedon

Walkill silt loam, occasionally flooded, about 1.8 miles southeast of Enon, in Mad River Township; about 345 feet west and 710 feet south of the northeast corner of sec. 35, T. 4, R. 8:

Ap—0 to 6 inches; very dark grayish brown (2.5Y 3/2) silt loam, grayish brown (2.5Y 5/2) dry; weak fine and very fine granular structure; friable; common medium and fine roots; slightly effervescent; slightly alkaline; clear wavy boundary.

Bg1—6 to 11 inches; dark gray (10YR 4/1) silt loam; common medium prominent brown (7.5YR 4/4) mottles; weak medium and fine subangular blocky structure; friable; common medium and fine roots; many faint dark gray (10YR 4/1) coatings on faces of peds; slightly effervescent; slightly alkaline; gradual wavy boundary.

Bg2—11 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium prominent brown (7.5YR 4/4) and common medium distinct grayish brown (10YR 5/2) mottles; weak medium and fine subangular blocky structure; firm; few medium and fine roots; common faint dark gray (10YR 4/1) coatings on faces of peds; slightly effervescent; slightly alkaline; gradual wavy boundary.

Bg3—16 to 19 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium distinct brown (7.5YR 4/4) and grayish brown (2.5Y 5/2) mottles; weak medium subangular blocky structure; firm; few very fine roots; common dark gray (10YR 4/1) coatings on faces of peds; slightly effervescent; slightly alkaline; abrupt wavy boundary.

2Oa1—19 to 32 inches; black (10YR 2/1) sapric material, very dark brown (10YR 2/2) rubbed; about 5 percent fibers; massive; friable; few very fine roots; few sand grains and fine pebbles; neutral; gradual wavy boundary.

2Oa2—32 to 42 inches; sapric material, very dark brown (10YR 2/2) broken face and rubbed; about 15 percent fiber; massive; friable; few sand grains and fine pebbles; neutral; gradual wavy boundary.

2Oa3—42 to 53 inches; sapric material, very dark brown (10YR 2/2) broken face and rubbed; about 40 percent fibers; massive; friable; neutral; clear wavy boundary.

3Cg1—53 to 65 inches; dark gray (10YR 4/1) gravelly loam; massive; very friable; about 30 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

3Cg2—65 to 72 inches; dark gray (10YR 4/1) gravelly loam; massive; firm; about 20 percent gravel; slightly effervescent; moderately alkaline; gradual wavy boundary.

3Cg3—72 to 80 inches; gray (10YR 5/1) very gravelly sandy loam; single grain; loose; about 45 percent gravel; slightly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the mineral soil over the organic soil material: 16 to 40 inches

Content of rock fragments: 3C horizon—5 to 45 percent

Ap horizon:

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

Texture—silt loam, silty clay loam, loam

Bg horizon:

Color—hue of 10YR or 2.5Y, value of 3 to 5, chroma of 1 or 2

Texture—silt loam, loam, silty clay loam

Cg horizon (if it occurs):

Color—hue of 10YR or 2.5Y, value of 3 to 5, chroma of 1 or 2

Texture—silt loam, loam, silty clay loam

2O horizon:

Color—hue of 5YR to 2.5Y or neutral, value of 2 or 3, chroma of 0 to 2

Texture—sapric material

3Cg horizon:

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

Texture—loam, sandy loam, or the gravelly and very gravelly analogs of these textures

Warsaw Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate in the subsoil and very rapid in the substratum

Parent material: Loamy material over outwash

Landforms: Outwash plains and outwash terraces

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 3 percent

Adjacent soils: Eldean, Lippincott

Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Arguidolls

Typical Pedon

Warsaw silt loam, 0 to 3 percent slopes, about 1.5 miles southeast of Eagle City, in Moorefield Township; about 240 feet east and 2,190 feet south of the northwest corner of sec. 31, T. 5, R. 10:

Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium and fine granular structure; friable; common fine and very fine roots; few pebbles; moderately acid; clear wavy boundary.

Bt1—12 to 15 inches; brown (10YR 4/3) silty clay loam; weak medium and fine subangular blocky structure; friable; few fine and very fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common faint dark brown (10YR 3/3) clay films in pores and channels and on faces of peds; few pebbles; moderately acid; gradual wavy boundary.

Bt2—15 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common distinct dark brown (10YR 3/3) clay films in pores and channels and on faces of peds; few pebbles; slightly acid; clear wavy boundary.

2Bt3—22 to 29 inches; brown (10YR 4/3) gravelly clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; many distinct dark brown (7.5YR 3/2) clay films in pores and channels and on faces of peds; about 20 percent gravel; neutral; clear wavy boundary.

2Bt4—29 to 32 inches; brown (10YR 4/3) gravelly clay loam; moderate coarse and medium subangular blocky structure; friable; few fine and very fine roots; common faint dark brown (7.5YR 3/2) clay films in pores and channels and on faces of peds; about 30 percent gravel; neutral; abrupt wavy boundary.

2BC—32 to 36 inches; dark brown (7.5YR 3/2) gravelly sandy loam; weak coarse and medium subangular blocky structure; friable; few fine and very fine roots; about 35 percent gravel; slightly effervescent; slightly alkaline; clear irregular boundary.

2C—36 to 80 inches; brown (10YR 5/3) very gravelly coarse sand; single grain; loose; about 60 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 24 to 40 inches

Thickness of the mollic epipedon: 10 to 22 inches

Depth to carbonates: 20 to 36 inches

Content of rock fragments: Ap horizon—0 to 5 percent;
Bt horizon—0 to 30 percent; 2C horizon—30 to 60 percent

Ap horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 to 3

Texture—silt loam

Bt horizon:

Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 to 4

Texture—silty clay loam, clay loam

2Bt horizon:

Color—hue of 10YR or 7.5YR, value of 3 or 4, chroma of 2 to 4

Texture—gravelly clay loam or gravelly sandy clay loam

2C horizon:

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

Texture—gravelly or very gravelly coarse sand

Waupecan Series

Depth class: Very deep

Drainage class: Well drained

Permeability: Moderate in the subsoil and very rapid in the substratum

Parent material: Silty material over sandy and gravelly glacial outwash

Landforms: Outwash plains and outwash terraces

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Lippincott

Taxonomic classification: Fine-silty, mixed, mesic Typic Argiudolls

Typical Pedon

Waupecan silt loam, 0 to 2 percent slopes, about 4 miles east of Springfield, in Springfield Township; about 2,190 feet west and 90 feet south of the northeast corner of sec. 10, T. 5, R. 9:

Ap—0 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine and very fine roots; strongly acid; clear wavy boundary.

AB—13 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable;

few fine and very fine roots; strongly acid; gradual wavy boundary.

Bt1—17 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; few faint brown (10YR 4/3) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings in pores and channels and on faces of peds; strongly acid; gradual wavy boundary.

Bt2—24 to 35 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings in pores and channels and on faces of peds; strongly acid; clear wavy boundary.

2Bt3—35 to 39 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common distinct dark brown (7.5YR 3/2) clay films on faces of peds; about 5 percent gravel; strongly acid; gradual wavy boundary.

2Bt4—39 to 45 inches; brown (10YR 4/3) sandy clay loam; moderate medium and fine subangular blocky structure; firm; few fine and very fine roots; common faint dark brown (7.5YR 3/2) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organo-clay coatings on faces of peds; about 10 percent gravel; strongly acid; gradual wavy boundary.

2Bt5—45 to 48 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure; firm; few very fine roots; common faint dark brown (7.5YR 3/2) clay films on faces of peds; many distinct very dark gray (10YR 3/1) organo-clay coatings on faces of peds; about 10 percent gravel; neutral; clear wavy boundary.

2C1—48 to 54 inches; brown (10YR 4/3) gravelly loamy coarse sand; single grain; loose; about 30 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

2C2—54 to 80 inches; dark yellowish brown (10YR 4/4) very gravelly coarse sand; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 65 inches

Thickness of the mollic epipedon: 10 to 20 inches

Thickness of the loess mantle: 24 to 48 inches

Content of rock fragments: 2Bt horizon—1 to 10 percent; 2C horizon—15 to 60 percent

A horizon:

Color—hue of 10YR, value of 2 or 3, chroma of 1 or 2
Texture—silt loam

Bt horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 3 to 6
Texture—silt loam, silty clay loam

2Bt horizon:

Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 3 to 6
Texture—silty clay loam, loam, clay loam, or sandy clay loam

2C horizon:

Color—hue of 10YR or 7.5YR, value of 3 to 5, chroma of 4 to 6
Texture—loamy coarse sand, coarse sand, or the gravelly and very gravelly analogs of these textures

Waynetown Series

Depth class: Very deep

Drainage class: Somewhat poorly drained

Permeability: Moderate

Parent material: Silty material over loamy outwash

Landforms: Outwash plains and outwash terraces

Position on the landform: Footslopes, micro-highs

Slope range: 0 to 2 percent

Adjacent soils: Drummer, Rush

Taxonomic classification: Fine-silty, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Waynetown silt loam, 0 to 2 percent slopes, about 4.5 miles northwest of South Charleston, in Harmony Township; about 1,110 feet north and 1,425 feet west of the center of sec. 31, T. 6, R. 9:

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine and very fine roots; moderately acid; abrupt smooth boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine and very fine subangular blocky structure; firm; common fine and very fine roots; many distinct grayish brown (2.5Y 5/2)

coatings on faces of peds; few fine brown (10YR 4/3) clay films on faces of peds; few fine black (N 2/0) concretions (iron and manganese oxides); moderately acid; clear wavy boundary.

Bt2—16 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; moderate medium and fine subangular blocky structure; firm; common fine and very fine roots; many distinct grayish brown (10YR 5/2) coatings on faces of peds; many distinct dark grayish brown (10YR 4/2) clay films in pores and channels and on faces of peds; few fine black (N 2/0) concretions (iron and manganese oxides); slightly acid; clear wavy boundary.

Bt3—22 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few fine and very fine roots; common distinct grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) clay films in pores and channels and on faces of peds; few fine black (N 2/0) concretions (iron and manganese oxides); slightly acid; clear wavy boundary.

2Btg1—34 to 45 inches; grayish brown (10YR 5/2) clay loam; many medium distinct light grayish brown (10YR 6/2) and common medium distinct yellowish brown (10YR 5/4) mottles; moderate coarse and medium subangular blocky structure; firm; few very fine roots; many distinct grayish brown (10YR 5/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) clay films in pores and channels and on faces of peds; common light gray (10YR 7/2), soft weathered limestone fragments; about 5 percent gravel, mostly in the lower part; neutral; clear wavy boundary.

3Btg2—45 to 51 inches; dark gray (10YR 4/1) gravelly loam; many medium faint dark grayish brown (10YR 4/2) and few fine faint dark gray (10YR 4/1) mottles; weak coarse subangular blocky structure; firm; few fine dark grayish brown (10YR 4/2) coatings on faces of peds; common distinct dark grayish brown (10YR 4/2) clay films in pores and channels, bridging sand grains, and on faces of peds; few light gray (10YR 7/2), soft weathered limestone fragments; about 15 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

3BCg—51 to 66 inches; dark grayish brown (10YR 4/2) gravelly sandy loam; weak coarse granular

structure; friable; about 35 percent gravel; slightly effervescent; slightly alkaline; gradual wavy boundary.

3Cg—66 to 80 inches; gray (10YR 5/1) very gravelly coarse sand; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 50 to 80 inches

Thickness of the silty mantle: 20 to 40 inches

Content of rock fragments: 2Bt horizon—0 to 10 percent; 3Bt horizon—15 to 30 percent; 3Cg horizon—20 to 45 percent

Ap horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 2 or 3

Texture—silt loam

Bt horizon:

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

Texture—silt loam, silty clay loam

2Btg horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 1 to 4

Texture—clay loam or loam

3Bt horizon:

Color—hue of 10YR or 2.5Y, value of 4 or 5, chroma of 1 to 4

Texture—gravelly clay loam, gravelly sandy clay loam, gravelly loam

3Cg horizon:

Color—hue of 10YR, value of 4 or 5, chroma of 1 or 2

Texture—gravelly or very gravelly coarse sand or loamy coarse sand

Westland Series

Depth class: Very deep

Drainage class: Very poorly drained

Permeability: Moderate in the subsoil and very rapid in the substratum

Parent material: Silty material over loamy, sandy, and gravelly glacial outwash

Landforms: Outwash plains, outwash terraces, and valley trains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Adjacent soils: Eldean, Ockley, Ross

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

Typical Pedon

Typical pedon of Westland silty clay loam, about 1.6 miles west of Pitchin, in Greene Township; about 950 feet south and 2,415 feet east of the center of sec. 29, T. 5, R. 8:

Ap—0 to 11 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; firm; few fine roots; few pebbles; slightly acid; clear wavy boundary.

Btg1—11 to 15 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; firm; few fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); few pebbles; neutral; clear wavy boundary.

Btg2—15 to 22 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium and fine subangular blocky structure; firm; few fine roots; few faint dark grayish brown (10YR 4/2) clay films in pores and channels; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few pebbles; neutral; gradual wavy boundary.

Btg3—22 to 35 inches; grayish brown (10YR 5/2) clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; few faint dark grayish brown (10YR 4/2) clay films in pores and channels; few pebbles; neutral; clear wavy boundary.

2BCg—35 to 51 inches; dark gray (10YR 4/1) gravelly loam; weak coarse subangular blocky structure; friable; about 30 percent gravel; slightly effervescent; slightly alkaline; clear wavy boundary.

2Cg—51 to 80 inches; dark grayish brown (10YR 4/2) very gravelly coarse sand stratified with loamy coarse sand in the lower part; single grain; loose; about 45 percent gravel; strongly effervescent; moderately alkaline.

Range in Characteristics

Thickness of the solum: 40 to 60 inches

Thickness of the mollic epipedon: 10 to 20 inches

Content of rock fragments: Ap horizon—0 to 4 percent;
Btg horizon—0 to 15 percent; 2BC horizon—5 to 40 percent; 2C horizon—15 to 50 percent

Ap horizon:

Color—hue of 10YR or 2.5Y, value of 2 or 3, chroma of 1 to 3

Texture—silty clay loam, silt loam

Btg horizon:

Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 or 2

Texture—silty clay loam or clay loam in the upper part; clay loam in the lower part

2BCg horizon:

Color—hue of 10YR or 2.5Y, value of 3 to 6, chroma of 1 or 2

Texture—loam, clay loam, sandy loam, or the gravelly and very gravelly analogs of these textures

2C horizon:

Color—hue of 10YR, value of 3 to 6, chroma of 1 to 3

Texture—the gravelly and very gravelly analogs of coarse sand or loamy coarse sand

Detailed Soil Map Units

The map units on the detailed soil maps in 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. More information about each map unit is given in Part II of this survey.

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. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

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

the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into 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 in Part II of this survey.

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.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Celina-Strawn complex, 0 to 2 percent slopes, is an example.

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

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see Contents in Part II) 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.

Ad—Adrian muck, drained

Setting

Landform: Till plains, outwash plains

Position on the landform: Open depressions

Slope range: 0 to 2 percent

Size of areas: 5 to 20 acres

Typical Profile

Surface tier:

0 to 10 inches—black, very friable muck

Subsurface tier:

10 to 22 inches—very dark gray, very friable muck

22 to 28 inches—brown, loose very gravelly sandy loam

Substratum:

28 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Very poorly drained

Dominant parent material: Organic deposits over outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 1 foot above to 1 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 55 to 75 percent

Potential for frost action: High

Available water capacity: 10.9 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 125 to 200 centimoles per kilogram in the surface layer

Other features: Organic soil layers

Similar components:

- Soils that have thinner organic deposits

- Soils that have less sand in the substratum

Composition

Adrian and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Linwood soils near the center of depressions
- Lippincott soils interfingering along margins of the unit
- Westland soils interfingering along margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ae—Adrian muck, undrained

Setting

Landform: Till plains, outwash plains

Position on the landform: Depressions

Slope range: 0 to 2 percent

Size of areas: 5 to 20 acres

Typical Profile

Surface tier:

0 to 10 inches—black, friable muck

Subsurface tier:

10 to 36 inches—black and dark brown, friable muck

Substratum:

36 to 80 inches—dark gray and dark grayish brown, friable and loose very gravelly sandy loam and very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Organic deposits over outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 1 foot above to 1 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 55 to 75 percent

Potential for frost action: High

Available water capacity: 15.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 125 to 200 centimoles per kilogram in the surface layer

Other features: Organic soil layers

Similar components:

- Soils that have thinner organic deposits
- Soils that have less sand in the substratum

Composition

Adrian and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Carlisle soils in the lower positions
- Linwood soils near the center of depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ca—Carlisle muck, drained

Setting

Landform: Till plains, outwash plains

Position on the landform: Open depressions

Slope range: 0 to 2 percent

Size of areas: 5 to 30 acres

Typical Profile

Surface tier:

0 to 10 inches—black, very friable muck

Subsurface tier:

10 to 35 inches—dark brown and black, friable muck

Bottom tier:

35 to 80 inches—dark reddish brown and dark brown, friable muck

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Organic material

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 70 to 99 percent

Potential for frost action: High

Available water capacity: 24 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 150 to 230 centimoles per kilogram in the surface layer

Other features: Organic soil layers

Similar components:

- Soils that have strata of coprogenous earth and marl
- Soils that have thinner organic deposits

Composition

Carlisle and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Adrian soils on slight rises and near margins of the unit
- Linwood soils near margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Cb—Carlisle muck, undrained

Setting

Landform: Till plains

Position on the landform: Depressions

Slope range: 0 to 2 percent

Size of areas: 5 to 30 acres

Typical Profile

Surface tier:

0 to 10 inches—black, friable muck

Subsurface tier:

10 to 80 inches—dark brown, black, reddish brown, and dark reddish brown, friable muck

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Organic materials

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 70 to 99 percent

Potential for frost action: High

Available water capacity: 24 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 150 to 230 centimoles per kilogram in the surface layer

Other features: Organic soil layers

Similar components:

- Soils that have strata of coprogenous earth and marl
- Soils that have thinner organic deposits

Composition

Carlisle and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Adrian soils interfingering along the margins of the unit
- Linwood soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

CcD2—Casco gravelly loam, 12 to 20 percent slopes, eroded

Setting

Landform: Outwash terraces

Position on the landform: Knolls, backslopes, shoulders

Size of areas: 5 to 15 acres

Typical Profile

Surface layer:

0 to 7 inches—dark brown, friable gravelly loam

Subsoil:

7 to 17 inches—dark brown and dark yellowish brown, friable clay loam and gravelly loam

Substratum:

17 to 80 inches—yellowish brown and brown, loose gravelly loamy coarse sand and gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Shallow to loose, sandy and gravelly outwash

Drainage class: Somewhat excessively drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Low

Available water capacity: 3.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Similar components:

- Soils that have more clay and gravel in the subsoil
- Soils in areas that are more severely eroded

Composition

Casco and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Eldean soils near the base of slopes
- Rodman soils at the center of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

CeA—Celina silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Micro-highs

Size of areas: 5 to 50 acres

Typical Profile

Surface layer:

0 to 9 inches—brown, friable silt loam

Subsoil:

9 to 30 inches—dark yellowish brown and yellowish brown, firm, mottled clay and clay loam

Substratum:

30 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Moderately well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 2.0 to 3.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer

Similar components:

- Soils in better drained areas
- Soils that have a thicker solum
- Soils that have less clay in the subsoil

Composition

Celina and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Crosby soils in depressions
- Kokomo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

CeB—Celina silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Low knolls

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 8 inches—brown, friable silt loam

Subsoil:

8 to 16 inches—brown, firm silty clay loam

16 to 27 inches—dark yellowish brown and yellowish brown, mottled, firm clay and clay loam

27 to 32 inches—yellowish brown, firm clay loam

Substratum:

32 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Moderately well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 2.0 to 3.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer

Similar components:

- Soils in better drained areas
- Soils that have a thinner solum
- Soils that are moderately eroded

Composition

Celina and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in the lower positions
- Kokomo soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

ChA—Celina-Strawn complex, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Celina—footslopes, micro-lows; Strawn—micro-highs

Size of areas: 3 to 20 acres

Typical Profile

Celina

Surface layer:

0 to 9 inches—brown, friable silt loam

Subsoil:

9 to 30 inches—dark yellowish brown and yellowish brown, firm, mottled silty clay loam and clay loam

Substratum:

30 to 80 inches—yellowish brown, firm loam

Strawn

Surface layer:

0 to 6 inches—brown, firm silt loam

Subsoil:

6 to 21 inches—brown and yellowish brown, firm silty clay loam

Substratum:

21 to 80 inches—yellowish brown, very firm silt loam and loam

Soil Properties and Qualities

Celina

Depth class: Very deep (more than 60 inches)

Drainage class: Moderately well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 2.0 to 3.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 8.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer

Similar components:

- Soils that have a thinner solum
- Soils that have more clay in the subsoil

Strawn

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 8.2 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 13 to 22 centimoles per kilogram in the surface layer

Composition

Celina and similar soils: 50 percent
Strawn and similar soils: 35 percent
Inclusions: 15 percent

Inclusions

- Crosby soils in depressions
- Kokomo soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

ChB—Celina-Strawn complex, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Celina—footslopes, backslopes, micro-lows; Strawn—shoulders, summits

Size of areas: 5 to 30 acres

Typical Profile

Celina

Surface layer:

0 to 10 inches—brown, friable silt loam

Subsoil:

10 to 30 inches—brown and dark yellowish brown, firm silty clay loam

Substratum:

30 to 80 inches—yellowish brown, firm loam

Strawn

Surface layer:

0 to 10 inches—brown, firm silty clay loam

Subsoil:

10 to 23 inches—dark yellowish brown, firm silty clay loam

Substratum:

23 to 80 inches—yellowish brown, very firm and firm silt loam and clay loam

Soil Properties and Qualities

Celina

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Moderately well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 2.0 to 3.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 8.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 9 to 19 centimoles per kilogram in the surface layer

Similar components:

- Soils in better drained areas
- Soils that are moderately eroded

Strawn

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Moderate

Available water capacity: 7.9 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Composition

Celina and similar soils: 50 percent

Strawn and similar soils: 35 percent

Inclusions: 15 percent

Inclusions

- Crosby soils in depressions
- Kokomo soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

CrA—Crosby silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Micro-highs

Size of areas: 5 to 50 acres

Typical Profile

Surface layer:

0 to 9 inches—dark grayish brown, friable silt loam

Subsoil:

9 to 25 inches—dark yellowish brown, mottled, firm clay

Substratum:

25 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Somewhat poorly drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 0.5 foot to 1.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer

Similar components:

- Soils that have a thicker solum
- Soils that have less clay in the subsoil

Composition

Crosby and similar soils: 70 percent

Inclusions: 30 percent

Inclusions

- Celina soils on slight rises
- Kokomo soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

CrB—Crosby silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes

Size of areas: 5 to 20 acres

Typical Profile

Surface layer:

0 to 9 inches—dark grayish brown, friable silt loam

Subsoil:

9 to 35 inches—dark yellowish brown, mottled, firm clay loam

Substratum:

35 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact till

Drainage class: Somewhat poorly drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 0.5 foot to 1.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer

Similar components:

- Soils that have a thicker solum

Composition

Crosby and similar soils: 70 percent

Inclusions: 30 percent

Inclusions

- Celina soils on low knolls
- Kokomo soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

DoE—Donnelsville channery silt loam, 18 to 30 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes, footslopes

Size of areas: 5 to 20 acres

Typical Profile

Surface layer:

0 to 11 inches—black, friable channery silt loam

Subsurface layer:

11 to 21 inches—dark grayish brown, friable channery silt loam

Subsoil:

21 to 36 inches—dark yellowish brown, friable very channery silt loam and very channery loam

Substratum:

36 to 47 inches—dark yellowish brown, friable extremely channery loam

Bedrock:

47 to 50 inches—dolomite

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Colluvium

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 5 to 10 percent

Potential for frost action: Moderate

Available water capacity: 2.8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 15 to 24 centimoles per kilogram in the surface layer

Other features: Channers on the surface

Similar components:

- Soils that have more clay in the subsoil

Composition

Donnelsville and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Milton soils near small rock outcrops and on small benches

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

DpF—Donnelsville-Rock outcrop complex, 30 to 70 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes

Size of areas: 10 to 40 acres

Typical Profile

Donnelsville

Surface layer:

0 to 14 inches—very dark gray, friable very channery loam

Subsoil:

14 to 30 inches—brown and yellowish brown, friable extremely channery loam

Substratum:

30 to 55 inches—light yellowish brown, friable extremely channery loam

Bedrock:

55 to 58 inches—dolomite

Soil Properties and Qualities

Donnelsville

Depth class: Deep (40 to 60 inches)

Drainage class: Well drained

Dominant parent material: Colluvium

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 5 to 10 percent

Potential for frost action: Moderate

Available water capacity: 3.8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 15 to 24 centimoles per kilogram in the surface layer

Composition

Donnelsville and similar soils: 70 percent

Rock outcrop: 15 percent

Inclusions: 15 percent

Inclusions

- Miamian soils that have a limestone substratum; near small areas of Rock outcrop and on small benches

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Dr—Drummer silty clay loam, gravelly substratum

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Size of areas: 20 to 150 acres

Typical Profile

Surface layer:

0 to 15 inches—very dark gray, firm silty clay loam

Subsoil:

15 to 42 inches—dark gray and gray, mottled, firm silty clay loam

42 to 47 inches—grayish brown, mottled, friable silt loam

Substratum:

47 to 80 inches—dark gray, loose gravelly loamy sand and very gravelly sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Poorly drained

Dominant parent material: Silty deposits over outwash

Native plant cover: Prairie grasses

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 0.5 foot above to 2.0 feet below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 5 to 7 percent

Potential for frost action: High

Available water capacity: 9.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 16 to 35 centimoles per kilogram in the surface layer

Composition

Drummer and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Thackery and Waynetown soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EmA—Eldean silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash terraces

Position on the landform: Treads, micro-highs

Size of areas: 10 to 100 acres

Typical Profile

Surface layer:

0 to 10 inches—dark yellowish brown, friable silt loam

Subsoil:

10 to 31 inches—brown, friable and firm clay loam, clay, and gravelly clay

31 to 38 inches—brown, firm very gravelly loam

Substratum:

38 to 80 inches—dark yellowish brown, loose extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Composition

Eldean and similar soils: 75 percent
 Inclusions: 25 percent

Inclusions

- Lippincott soils in depressions and drainageways
- Ockley soils in concave positions
- Savona soils in depressions
- Westland soils in depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EmB—Eldean silt loam, 2 to 6 percent slopes

Setting

Landform: Outwash terraces
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 50 acres

Typical Profile

Surface layer:
 0 to 10 inches—dark yellowish brown, friable silt loam
Subsoil:
 10 to 31 inches—brown and dark reddish brown,

firm silty clay loam, gravelly clay, and very gravelly clay loam

Substratum:

31 to 80 inches—dark yellowish brown, loose extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Depth to the water table: Greater than 6 feet
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Composition

Eldean and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Lippincott soils in depressions and drainageways
- Ockley soils in the flatter positions
- Savona soils near the base of sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EmB2—Eldean silt loam, 2 to 6 percent slopes, eroded

Setting

Landform: Outwash terraces
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:

0 to 8 inches—dark yellowish brown, friable silt loam

Subsoil:

8 to 18 inches—dark brown, firm clay
18 to 24 inches—yellowish brown, firm very gravelly loam

Substratum:

24 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 4.2 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 75 percent

Inclusions: 25 percent

Inclusions

- Ockley soils in the flatter positions
- Westland soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EmC2—Eldean silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Outwash terraces

Position on the landform: Risers

Size of areas: 5 to 15 acres

Typical Profile

Surface layer:

0 to 9 inches—dark yellowish brown, friable silt loam

Subsoil:

9 to 22 inches—dark brown, friable clay loam and firm clay
22 to 28 inches—brown and dark yellowish brown, firm clay and very gravelly clay
28 to 35 inches—yellowish brown, loose very gravelly sandy loam

Substratum:

35 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 4.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Miamian soils on shoulders

Management

For general and detailed information about

managing this map unit, see the following sections in Part II of this publication:

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

EnC2—Eldean-Casco complex, 6 to 12 percent slopes, eroded

Setting

Landform: Outwash terraces

Position on the landform: Eldean—backslopes;
Casco—shoulders

Size of areas: 5 to 20 acres

Typical Profile

Eldean

Surface layer:

0 to 7 inches—brown, friable clay loam

Subsoil:

7 to 22 inches—brown, firm gravelly clay loam

22 to 28 inches—dark yellowish brown, friable very gravelly sandy loam

Substratum:

28 to 80 inches—yellowish brown, loose extremely gravelly loamy sand

Casco

Surface layer:

0 to 7 inches—dark brown, friable gravelly loam

Subsoil:

7 to 19 inches—brown, friable clay loam and gravelly clay loam

Substratum:

19 to 80 inches—brown, loose very gravelly coarse sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Potential for frost action: Moderate

Available water capacity: 4.3 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Casco

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Somewhat excessively drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Low

Available water capacity: 3.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent

Casco and similar soils: 30 percent

Inclusions: 20 percent

Inclusions

- Miamian soils on slope breaks to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EpB2—Eldean-Miamian complex, 2 to 6 percent slopes, eroded

Setting

Landform: Kame moraines

Position on the landform: Eldean—backslopes,

shoulders; Miamian—shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Eldean

Surface layer:

0 to 7 inches—brown, firm silty clay loam

Subsoil:

7 to 17 inches—dark yellowish brown and brown, firm clay loam and clay
 17 to 21 inches—dark grayish brown, firm gravelly clay loam
 21 to 26 inches—yellowish brown, friable gravelly sandy loam

Substratum:

26 to 80 inches—dark yellowish brown, loose gravelly loamy coarse sand

Miamian

Surface layer:

0 to 8 inches—brown, friable silty clay loam

Subsoil:

8 to 29 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:

29 to 80 inches—brown, firm silt loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 4.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 7.9 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent
 Miamian and similar soils: 35 percent
 Inclusions: 15 percent

Inclusions

- Ockley soils in the less sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EpC2—Eldean-Miamian complex, 6 to 12 percent slopes, eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 10 to 80 acres

Typical Profile

Eldean

Surface layer:

0 to 6 inches—dark grayish brown, firm silt loam

Subsoil:

6 to 22 inches—dark yellowish brown and dark brown, firm clay loam and clay
 22 to 30 inches—dark brown, friable gravelly clay loam
 30 to 35 inches—yellowish brown, loose very gravelly sandy loam

Substratum:

35 to 80 inches—brown, loose very gravelly loamy sand

Miamian*Surface layer:*

0 to 6 inches—brown, friable silt loam

Subsoil:

6 to 27 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:

27 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities**Eldean**

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Potential for frost action: Moderate

Available water capacity: 4.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to dense till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent

Miamian and similar soils: 35 percent

Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes
- Westland soils in depressions and draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EpC3—Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded**Setting**

Landform: Kame moraines

Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits

Size of areas: 5 to 40 acres

Typical Profile**Eldean***Surface layer:*

0 to 5 inches—dark brown, firm clay loam

Subsoil:

5 to 20 inches—dark brown, firm gravelly clay loam

Substratum:

20 to 80 inches—brown and yellowish brown, loose gravelly and very gravelly loamy coarse sand stratified with loamy sand and loamy fine sand

Miamian*Surface layer:*

0 to 7 inches—brown, firm clay loam

Subsoil:

7 to 28 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:

28 to 80 inches—brown and yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Potential for frost action: Moderate

Available water capacity: 3.5 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer

Other features: Most of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to dense till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Potential for frost action: Moderate

Available water capacity: 6.8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer

Other features: Most of the original surface layer has been removed.

Composition

Eldean and similar soils: 50 percent

Miamian and similar soils: 35 percent

Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section

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

EpD2—Eldean-Miamian complex, 12 to 18 percent slopes, eroded

Setting

Landform: Kame moraines

Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders

Size of areas: 10 to 40 acres

Typical Profile

Eldean

Surface layer:

0 to 6 inches—dark grayish brown, friable silt loam

Subsoil:

6 to 21 inches—dark yellowish brown, firm and very firm clay loam and clay

21 to 26 inches—dark brown, firm gravelly clay loam

Substratum:

26 to 80 inches—brown, loose gravelly loamy coarse sand

Miamian

Surface layer:

0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:

5 to 15 inches—dark yellowish brown, firm silty clay loam and clay loam

15 to 22 inches—yellowish brown, firm loam

Substratum:

22 to 80 inches—brown and yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Potential for frost action: Moderate

Available water capacity: 4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 6.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
 Miamian and similar soils: 40 percent
 Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EpD3—Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 10 to 40 acres

Typical Profile

Eldean

Surface layer:
 0 to 5 inches—dark brown, firm clay loam

Subsoil:
 5 to 19 inches—dark yellowish brown, firm clay loam
 19 to 24 inches—dark brown, firm gravelly clay loam

Substratum:
 24 to 80 inches—brown, loose gravelly loamy sand

Miamian

Surface layer:
 0 to 6 inches—brown, firm clay loam

Subsoil:
 6 to 22 inches—dark yellowish brown, firm clay loam

Substratum:
 22 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 3.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None

Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
 Miamian and similar soils: 40 percent
 Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EpE2—Eldean-Miamian complex, 18 to 30 percent slopes, eroded

Setting

Landform: Kame moraines
Position on the landform: Eldean—backslopes, shoulders; Miamian—shoulders, summits
Size of areas: 10 to 20 acres

Typical Profile

Eldean

Surface layer:
 0 to 3 inches—dark grayish brown, friable silt loam
Subsoil:
 3 to 5 inches—yellowish brown, friable loam
 5 to 24 inches—brown and dark yellowish brown, firm silty clay loam and clay loam
 24 to 35 inches—dark brown, friable gravelly loam

Substratum:

35 to 80 inches—dark yellowish brown and yellowish brown gravelly loamy sand and coarse sand

Miamian

Surface layer:
 0 to 5 inches—dark grayish brown, friable silt loam
Subsoil:
 5 to 37 inches—yellowish brown, firm silty clay loam and clay loam
Substratum:
 37 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to loose, sandy and gravelly outwash
Drainage class: Well drained
Dominant parent material: Outwash
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 4.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Miamian

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to dense till
Drainage class: Well drained
Dominant parent material: Till and a thin layer of loess
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent
 Miamian and similar soils: 40 percent
 Inclusions: 15 percent

Inclusions

- Casco soils on the steeper part of slopes
- Rodman soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EsE3—Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded

Setting

Landform: Kame moraines

Position on the landform: Eldean—shoulders, summits;
Rodman—backslopes

Size of areas: 10 to 20 acres

Typical Profile

Eldean

Surface layer:

0 to 3 inches—brown, friable clay loam

Subsoil:

3 to 27 inches—strong brown and dark brown, firm clay and gravelly clay loam

Substratum:

27 to 80 inches—dark yellowish brown, loose gravelly coarse sand

Rodman

Surface layer:

0 to 11 inches—very dark grayish brown, friable gravelly loam

Subsoil:

11 to 15 inches—dark yellowish brown, very friable very gravelly sandy loam

Substratum:

15 to 80 inches—yellowish brown, loose, stratified coarse sand and very gravelly coarse sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Potential for frost action: Moderate

Available water capacity: 4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 12 to 24 centimoles per kilogram in the surface layer

Other features: Most of the original surface layer has been removed.

Rodman

Depth class: Very deep (more than 60 inches)

Root zone: Shallow to loose, sandy and gravelly outwash

Drainage class: Excessively drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 2 to 4 percent

Potential for frost action: Moderate

Available water capacity: 3 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 5 to 18 centimoles per kilogram in the surface layer

Other features: Most of the original surface layer has been removed.

Composition

Eldean and similar soils: 45 percent

Rodman and similar soils: 40 percent

Inclusions: 15 percent

Inclusions

- Miamian soils on slope breaks to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EuB—Eldean-Urban land complex, 2 to 6 percent slopes

Setting

Landform: Outwash terraces

Position on the landform: Shoulders, summits

Size of areas: 50 to 100 acres

Typical Profile

Eldean

Surface layer:

0 to 10 inches—dark brown, friable silt loam

Subsurface layer:

10 to 25 inches—brown, firm silty clay loam and gravelly clay loam

Subsoil:

25 to 31 inches—dark reddish brown, firm very gravelly clay loam

Substratum:

31 to 80 inches—brown, loose extremely gravelly loamy sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 5 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Eldean and similar soils: 45 percent

Urban land: 40 percent

Inclusions: 15 percent

Inclusions

- Lippincott soils in depressions and drainageways

- Savona soils near the base of sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

EuC—Eldean-Urban land complex, 6 to 12 percent slopes

Setting

Landform: Outwash terraces

Position on the landform: Shoulders, summits

Size of areas: 20 to 50 acres

Typical Profile

Eldean

Surface layer:

0 to 9 inches—dark yellowish brown, friable silt loam

Subsoil:

9 to 22 inches—dark brown, friable clay loam and firm clay

22 to 30 inches—brown and dark yellowish brown, firm clay and very gravelly clay

30 to 35 inches—yellowish brown, loose very gravelly sandy loam

Substratum:

35 to 80 inches—brown, loose very gravelly loamy sand

Soil Properties and Qualities

Eldean

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to loose, sandy and gravelly outwash

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 5.2 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Eldean and similar soils: 45 percent
Urban land: 40 percent
Inclusions: 15 percent

Inclusions

- Miamian soils on slope breaks to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ge—Genesee silt loam, till substratum, rarely flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

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

Subsoil:
10 to 25 inches—brown, friable silt loam
25 to 48 inches—brown, mottled, friable loam and silt loam

Substratum:
48 to 70 inches—dark yellowish brown and yellowish brown, friable and loose gravelly loam and gravelly loamy sand
70 to 80 inches—dark gray, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland

Frequency of flooding: Rare
Kind of water table: Apparent
Depth to the water table: 3 to 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 10.3 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 21 centimoles per kilogram in the surface layer

Composition

Genesee and similar soils: 100 percent

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Gn—Genesee silt loam, till substratum, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
0 to 11 inches—brown, friable silt loam

Substratum:
11 to 42 inches—brown and yellowish brown, friable loam
42 to 52 inches—grayish brown, mottled, friable loam
52 to 72 inches—brown and dark yellowish brown, loose gravelly sandy loam and gravelly coarse sand
72 to 80 inches—gray, mottled, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Occasional

Kind of water table: Apparent
Seasonal high water table: 3 to 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 11.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 9 to 21 centimoles per kilogram in the surface layer

Composition

Genesee and similar soils: 75 percent
 Inclusions: 25 percent

Inclusions

- Sloan soils in sloughs and oxbows
- Ockley soils on low benches adjacent to the uplands

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ko—Kokomo silty clay loam

Setting

Landform: Till plains
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 20 to several hundred acres

Typical Profile

Surface layer:
 0 to 11 inches—very dark gray, firm silty clay loam

Subsurface layer:
 11 to 19 inches—very dark gray, mottled, firm silty clay loam

Subsoil:
 19 to 52 inches—grayish brown and light brownish gray, mottled, firm silty clay loam

Substratum:
 52 to 80 inches—yellowish brown, mottled, calcareous, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 0.5 foot above to 0.5 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 3 to 6 percent
Potential for frost action: High
Available water capacity: 9.8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 16 to 33 centimoles per kilogram in the surface layer

Composition

Kokomo and similar soils: 90 percent
 Inclusions: 10 percent

Inclusions

- Celina soils on slight rises
- Crosby soils on slight rises
- Strawn soils on slight rises and low knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Lg—Linwood muck, undrained

Setting

Landform: Till plains, outwash plains
Position on the landform: Depressions
Slope range: 0 to 2 percent
Size of areas: 5 to 20 acres

Typical Profile

Surface tier:
 0 to 14 inches—black, very friable muck (sapric material)

Subsurface tier:

14 to 36 inches—black, friable muck

Substratum:

36 to 80 inches—gray and dark gray, friable silt loam

Soil Properties and Qualities*Depth class:* Very deep (more than 60 inches)*Root zone:* Restricted by seasonal high water table*Drainage class:* Very poorly drained*Dominant parent material:* Organic deposits over glacial deposits*Native plant cover:* Woodland*Flooding:* None*Kind of water table:* Apparent*Seasonal high water table:* 1 foot above to 1 foot below the surface*Ponding duration:* Very long*Content of organic matter in the surface layer:* 40 to 70 percent*Potential for frost action:* High*Available water capacity:* 18.1 inches to a depth of 60 inches or root-limiting layer*Cation-exchange capacity:* 150 to 230 centimoles per kilogram in the surface layer*Other features:* Organic soil layers**Composition**

Linwood and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Adrian soils on slight rises
- Lippincott soils interfingering along the margins of the unit
- Westland soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Lh—Linwood mucky silt loam, drained**Setting***Landform:* Till plains, outwash plains*Position on the landform:* Depressions*Slope range:* 0 to 2 percent*Size of areas:* 5 to 20 acres**Typical Profile***Surface tier:*

0 to 9 inches—black, very friable mucky silt loam

Subsurface tier:

9 to 28 inches—black and very dark gray, firm muck

Substratum:

28 to 80 inches—dark gray and gray, firm silt loam and gravelly loamy coarse sand

Soil Properties and Qualities*Depth class:* Very deep (more than 60 inches)*Root zone:* Restricted by seasonal high water table*Drainage class:* Very poorly drained*Dominant parent material:* Organic deposits over glacial deposits*Native plant cover:* Woodland*Flooding:* None*Kind of water table:* Apparent*Seasonal high water table:* 1 foot above to 1 foot below the surface*Ponding duration:* Very long*Content of organic matter in the surface layer:* 10 to 20 percent*Potential for frost action:* High*Available water capacity:* 14.6 inches to a depth of 60 inches or root-limiting layer*Cation-exchange capacity:* 10 to 30 centimoles per kilogram in the surface layer*Other features:* Organic soil layers**Composition**

Linwood and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Adrian soils on slight rises
- Patton soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Lm—Lippincott mucky silt loam**Setting**

Landform: Till plains, outwash plains

Position on the landform: Footslopes, depressions, drainageways

Slope range: 0 to 2 percent

Size of areas: 10 to 30 acres

Typical Profile

Surface layer:

0 to 14 inches—black, friable mucky silt loam

Subsoil:

14 to 31 inches—very dark gray and grayish brown, mottled, firm silty clay loam

31 to 42 inches—grayish brown, mottled, firm silt loam

Substratum:

42 to 80 inches—brown and grayish brown, mottled, friable and loose gravelly loamy sand and gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 1 foot above to 1 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 10 to 20 percent

Potential for frost action: Moderate

Available water capacity: 8.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 28 to 56 centimoles per kilogram in the surface layer

Composition

Lippincott and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Adrian soils in depressions and drainageways
- Patton soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Lp—Lippincott silty clay loam**Setting**

Landform: Till plains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Size of areas: 20 to 200 acres

Typical Profile

Surface layer:

0 to 7 inches—black, friable silty clay loam

Subsurface layer:

7 to 13 inches—black, mottled, firm silty clay loam

Subsoil:

13 to 27 inches—dark gray and gray, mottled, firm and very firm silty clay, clay, and clay loam

27 to 34 inches—grayish brown, mottled, friable gravelly silt loam

Substratum:

34 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 1 foot above to 1 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 4 to 8 percent

Potential for frost action: Moderate

Available water capacity: 6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 20 to 40 centimoles per kilogram in the surface layer

Composition

Lippincott and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Savona soils on slight rises
- Westland soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Lu—Lippincott-Urban land complex**Setting**

Landform: Outwash plains

Position on the landform: Footslopes, open depressions, drainageways

Size of areas: 20 to 40 acres

Typical Profile**Lippincott**

Surface layer:

0 to 7 inches—black, friable silty clay loam

Subsurface layer:

7 to 13 inches—black, mottled, firm silty clay loam

Subsoil:

13 to 23 inches—dark gray and gray, mottled, firm silty clay, clay, and clay loam

23 to 29 inches—grayish brown, mottled gravelly silt loam

Substratum:

29 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities**Lippincott**

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 1 foot above to 1 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 4 to 8 percent

Potential for frost action: Moderate

Available water capacity: 6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 20 to 40 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Lippincott and similar soils: 50 percent

Urban land: 35 percent

Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises
- Savona soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MgB2—Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded**Setting**

Landform: Till plains

Position on the landform: Backslopes, shoulders

Size of areas: 10 to 30 acres

Typical Profile

Surface layer:

0 to 8 inches—brown, firm silty clay loam

Subsoil:

8 to 25 inches—dark yellowish brown and yellowish brown, very firm and firm clay and clay loam

Substratum:

25 to 47 inches—yellowish brown, firm loam

Bedrock:

47 to 50 inches—limestone

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till over limestone
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 6.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Milton soils in dissected areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MgC2—Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 5 to 10 acres

Typical Profile

Surface layer:
 0 to 7 inches—brown, firm silty clay loam
Subsoil:
 7 to 25 inches—dark yellowish brown and

yellowish brown, firm and very firm clay loam and clay

Substratum:
 25 to 53 inches—yellowish brown, firm loam

Bedrock:
 53 to 56 inches—limestone

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till over limestone
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 6.5 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Milton soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MgE2—Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders
Size of areas: 10 to 20 acres

Typical Profile*Surface layer:*

0 to 5 inches—dark grayish brown, firm silty clay loam

Subsoil:

5 to 26 inches—dark yellowish brown and brown, firm and very firm silty clay loam and clay

Substratum:

26 to 43 inches—yellowish brown, firm silt loam

Bedrock:

43 to 46 inches—limestone

Soil Properties and Qualities

Depth class: Deep (40 to 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till over limestone

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 5.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 20 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Donnelsville soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MhA—Miamian silt loam, 0 to 2 percent slopes**Setting**

Landform: Till plains

Position on the landform: Micro-highs

Size of areas: 5 to 80 acres

Typical Profile*Surface layer:*

0 to 10 inches—brown, friable silt loam

Subsoil:

10 to 22 inches—yellowish brown, friable silt loam and silty clay loam

22 to 37 inches—yellowish brown, firm silty clay loam and clay loam

Substratum:

37 to 80 inches—yellowish brown and dark yellowish brown, firm loam and clay loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 8.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Crosby soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section

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

MhB—Miamian silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders

Size of areas: 10 to 50 acres

Typical Profile

Surface layer:

0 to 10 inches—brown, friable silt loam

Subsoil:

10 to 14 inches—yellowish brown, friable silty clay loam

14 to 36 inches—dark yellowish brown and yellowish brown, firm clay

Substratum:

36 to 80 inches—yellowish brown, very firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Celina soils in the more sloping areas and near margins of the unit
- Crosby soils near the base of sloping areas
- Eldean soils in the more sloping areas

Management

For general and detailed information about

managing this map unit, see the following sections in Part II of this publication:

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

MhB2—Miamian silt loam, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 50 acres

Typical Profile

Surface layer:

0 to 8 inches—dark grayish brown, friable silt loam

Subsoil:

8 to 30 inches—dark yellowish brown and yellowish brown, firm silty clay loam and clay

Substratum:

30 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Celina soils in the more sloping areas and near margins of the unit

- Crosby soils near the base of sloping areas
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MhC—Miamian silt loam, 6 to 12 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 4 inches—very dark grayish brown, friable silt loam

Subsoil:

4 to 9 inches—dark yellowish brown, friable silty clay loam

9 to 34 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:

34 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Kokomo soils in draws and potholes
- Celina soils in drainageways
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MhC2—Miamian silt loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 6 inches—brown, friable silt loam

Subsoil:

6 to 27 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:

27 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 90 percent
Inclusions: 10 percent

Inclusions

- Celina soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MhD2—Miamian silt loam, 12 to 18 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:

5 to 8 inches—brown, friable silt loam

8 to 22 inches—yellowish brown, firm silty clay loam and clay

22 to 31 inches—dark yellowish brown and yellowish brown, firm silty clay loam and silt loam

Substratum:

31 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.3 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MhE—Miamian silt loam, 18 to 30 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 80 acres

Typical Profile

Surface layer:

0 to 4 inches—dark grayish brown, friable silt loam

Subsoil:

4 to 8 inches—yellowish brown, friable silt loam

8 to 38 inches—dark yellowish brown and yellowish brown, firm silty clay loam

Substratum:

38 to 80 inches—yellowish brown, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.7 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Composition

Miamian and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MhE2—Miamian silt loam, 18 to 30 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 80 acres

Typical Profile

Surface layer:

0 to 5 inches—dark grayish brown, friable silt loam

Subsoil:

5 to 37 inches—yellowish brown, firm silty clay loam and clay loam

Substratum:

37 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till and a thin layer of loess

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MkB2—Miamian silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 7 inches—brown, firm silty clay loam

Subsoil:

7 to 23 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:

23 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Crosby soils in drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MkC2—Miamian silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
 0 to 7 inches—brown, firm silty clay loam
Subsoil:
 7 to 23 inches—dark yellowish brown and yellowish brown, firm clay and clay loam
Substratum:
 23 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till

Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 90 percent
 Inclusions: 10 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MkD2—Miamian silty clay loam, 12 to 18 percent slopes, eroded

Setting

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

Typical Profile

Surface layer:
 0 to 6 inches—brown, firm silty clay loam
Subsoil:
 6 to 20 inches—dark yellowish brown and yellowish brown, firm clay
Substratum:
 20 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained

Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 6.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MmC3—Miamian clay loam, 6 to 12 percent slopes, severely eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
 0 to 7 inches—brown, firm clay loam

Subsoil:
 7 to 19 inches—dark yellowish brown, very firm clay loam and clay
 19 to 28 inches—yellowish brown, firm clay loam

Substratum:
 28 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.3 to 1.0 percent
Potential for frost action: Moderate
Available water capacity: 6.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Miamian and similar soils: 80 percent
 Inclusions: 20 percent

Inclusions

- Kokomo soils in draws and potholes
- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MmD3—Miamian clay loam, 12 to 18 percent slopes, severely eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
 0 to 5 inches—brown, firm clay loam

Subsoil:
 5 to 20 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:
 20 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.3 to 1.0 percent
Potential for frost action: Moderate
Available water capacity: 6.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MmE3—Miamian clay loam, 18 to 30 percent slopes, severely eroded

Setting

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

Typical Profile

Surface layer:
 0 to 4 inches—brown, firm clay loam
Subsoil:
 4 to 20 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:

20 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 0.3 to 1.0 percent
Potential for frost action: Moderate
Available water capacity: 6.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 14 to 20 centimoles per kilogram in the surface layer
Other features: Most of the original surface layer has been removed.

Composition

Miamian and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Eldean soils in the more sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MnB—Miamian-Urban land complex, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 50 to 100 acres

Typical Profile

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

Subsoil:

- 10 to 14 inches—yellowish brown, friable silty clay loam
- 14 to 36 inches—dark yellowish brown and yellowish brown, firm clay

Substratum:

36 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities**Miamian**

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Miamian and similar soils: 50 percent

Urban land: 45 percent

Inclusions: 5 percent

Inclusions

- Crosby soils near the base of sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MnC—Miamian-Urban land complex, 6 to 12 percent slopes**Setting**

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 50 to 100 acres

Typical Profile**Miamian***Surface layer:*

0 to 4 inches—very dark grayish brown, friable silt loam

Subsoil:

4 to 9 inches—dark yellowish brown, friable silty clay loam

9 to 34 inches—dark yellowish brown and yellowish brown, firm clay and clay loam

Substratum:

34 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities**Miamian**

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.5 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 18 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Miamian and similar soils: 50 percent

Urban land: 30 percent

Inclusions: 20 percent

Inclusions

- Celina soils in the flatter positions
- Crosby soils in concave parts of slopes and near the base of sloping areas
- Eldean soils in the more sloping areas
- Kokomo soils in draws and depressions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Mo—Milford silty clay loam, sandy substratum

Setting

Landform: Lake plains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Size of areas: 20 to several hundred acres

Typical Profile

Surface layer:

0 to 10 inches—black, friable silty clay loam

Subsurface layer:

10 to 18 inches—black, mottled, firm silty clay loam

Subsoil:

18 to 42 inches—very dark gray, dark grayish brown, and gray, mottled, firm silty clay

Substratum:

42 to 55 inches—gray, mottled, firm silty clay loam

55 to 80 inches—grayish brown and brown, firm loam and loose loamy coarse sand and gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Dominant parent material: Lacustrine deposits over outwash

Native plant cover: Prairie grasses

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 4 to 6 percent

Potential for frost action: High

Available water capacity: 11.5 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 26 to 36 centimoles per kilogram in the surface layer

Composition

Milford and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Linwood soils in the more depressional positions
- Thackery soils on slight rises
- Waynetown soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ms—Millsdale silty clay loam

Setting

Landform: Till plains, stream terraces

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Size of areas: 10 to 50 acres

Typical Profile

Surface layer:

0 to 6 inches—very dark gray, friable silty clay loam

Subsurface layer:

6 to 12 inches—very dark gray, mottled, firm silty clay loam

Subsoil:

12 to 34 inches—very dark gray, dark gray, and gray, mottled, firm silty clay and silty clay loam

Bedrock:

34 to 37 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Till and limestone residuum

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Seasonal high water table: 1 foot above to 1 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 4 to 7 percent

Potential for frost action: High

Available water capacity: 5.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 20 to 36 centimoles per kilogram in the surface layer

Composition

Millsdale and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Randolph soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MtA—Milton silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Micro-highs

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 10 inches—dark grayish brown, friable silt loam

Subsoil:

10 to 18 inches—yellowish brown, firm silty clay loam and clay loam

18 to 23 inches—dark brown, firm clay

Bedrock:

23 to 26 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Till and limestone residuum

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 22 centimoles per kilogram in the surface layer

Composition

Milton and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MtB—Milton silt loam, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 9 inches—dark brown, friable silt loam

Subsoil:

9 to 23 inches—dark yellowish brown and brown, firm silty clay loam and clay

23 to 31 inches—brown, firm clay loam

Bedrock:

31 to 34 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained

Dominant parent material: Till and limestone residuum

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: Moderate
Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 10 to 22 centimoles per kilogram in the surface layer

Composition

Milton and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MvC2—Milton silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 5 to 20 acres

Typical Profile

Surface layer:
 0 to 6 inches—brown, firm silty clay loam
Subsoil:
 6 to 22 inches—dark yellowish brown and yellowish brown, firm silty clay loam and clay
Bedrock:
 22 to 25 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Dominant parent material: Till and limestone residuum
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: Moderate
Available water capacity: 3.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 16 to 24 centimoles per kilogram in the surface layer
Other features: Part of the original surface layer has been removed.

Composition

Milton and similar soils: 80 percent
 Inclusions: 20 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

MxB—Milton-Urban land complex, 2 to 6 percent slopes

Setting

Landform: Till plains
Position on the landform: Backslopes, shoulders, summits
Size of areas: 20 to 100 acres

Typical Profile

Milton
Surface layer:
 0 to 9 inches—dark brown, friable silt loam
Subsoil:
 9 to 31 inches—dark yellowish brown and brown, firm silty clay loam and clay
Bedrock:
 31 to 34 inches—dolomite

Soil Properties and Qualities

Milton

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Dominant parent material: Till and limestone residuum

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 22 centimoles per kilogram in the surface layer

Urban land

Definition: Areas in which the surface layer is impervious because of pavement or buildings

Composition

Milton and similar soils: 50 percent

Urban land: 35 percent

Inclusions: 15 percent

Inclusions

- Miamian soils on crests of knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

OcA—Ockley silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Treads, micro-highs

Size of areas: 5 to 100 acres

Typical Profile

Surface layer:

0 to 9 inches—brown, friable silt loam

Subsoil:

9 to 15 inches—brown, friable silt loam

15 to 34 inches—dark brown and strong brown, friable silty clay loam and clay loam

34 to 43 inches—dark brown and brown, firm gravelly clay loam

Substratum:

43 to 80 inches—yellowish brown and dark yellowish brown, loose loamy coarse sand and very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Deep to sand and gravel

Drainage class: Well drained

Dominant parent material: Silty material or loess and outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer

Composition

Ockley and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises
- Westland soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

OcB—Ockley silt loam, 2 to 6 percent slopes

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Footslopes, backslopes, shoulders, summits

Size of areas: 5 to 100 acres

Typical Profile

Surface layer:

0 to 9 inches—brown, friable silt loam

Subsoil:

9 to 45 inches—dark yellowish brown and dark brown, firm and friable silty clay loam, clay loam, and loam

45 to 49 inches—dark brown, friable gravelly clay loam

Substratum:

49 to 80 inches—yellowish brown, loose gravelly coarse sand stratified with coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Deep to sand and gravel

Drainage class: Well drained

Dominant parent material: Silty material or loess and outwash

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 8.2 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 3 to 15 centimoles per kilogram in the surface layer

Composition

Ockley and similar soils: 75 percent

Inclusions: 25 percent

Inclusions

- Westland soils in depressions and draws
- Eldean soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Pa—Patton silty clay loam**Setting**

Landform: Lake plains

Position on the landform: Footslopes, open depressions, drainageways

Slope range: 0 to 2 percent

Size of areas: 20 to several hundred acres

Typical Profile**Surface layer:**

0 to 12 inches—black, friable and firm silty clay loam

Subsoil:

12 to 36 inches—dark gray and gray, mottled, firm silty clay loam and silt loam

Substratum:

36 to 80 inches—gray and dark gray, firm and friable silt loam and loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Lacustrine deposits

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Seasonal high water table: 0.5 foot above to 2.0 feet below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 3 to 5 percent

Potential for frost action: High

Available water capacity: 12 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 22 to 31 centimoles per kilogram in the surface layer

Composition

Patton and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Linwood soils
- Milford soils interfingering along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Pg—Pits, gravel**Setting**

Landform: Till plains

Size of areas: 2 to 100 acres

Soil Properties and Qualities

Definition: Open excavations from which gravel and sand have been removed

Composition

Pits, gravel: 100 percent

Ph—Pits, quarry**Setting**

Landform: Till plains

Size of areas: 20 to 100 acres

Soil Properties and Qualities

Definition: Areas where dolomite has been quarried

Composition

Pits, quarry: 100 percent

RaA—Randolph silt loam, 0 to 2 percent slopes**Setting**

Landform: Till plains

Position on the landform: Micro-highs

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 10 inches—dark grayish brown, friable silt loam

Subsoil:

10 to 19 inches—yellowish brown and dark yellowish brown, mottled, firm silty clay loam
19 to 25 inches—brown, mottled, firm clay

Bedrock:

25 to 28 inches—dolomite

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Till and limestone residuum

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 1.0 to 2.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 4.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 8 to 22 centimoles per kilogram in the surface layer

Composition

Randolph and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Celina soils on slight rises
- Millsdale soils in draws

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

RgE—Rodman gravelly loam, 18 to 35 percent slopes**Setting**

Landform: Kame moraines

Position on the landform: Backslopes

Size of areas: 10 to 100 acres

Typical Profile

Surface layer:

0 to 7 inches—very dark grayish brown, very friable gravelly loam

Subsoil:

7 to 12 inches—dark yellowish brown, very friable gravelly sandy loam

Substratum:

12 to 80 inches—yellowish brown, loose extremely gravelly sand and gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Shallow to sand and gravel

Drainage class: Excessively drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 2 to 4 percent
Potential for frost action: Low
Available water capacity: 2.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 5 to 18 centimoles per kilogram in the surface layer

Composition

Rodman and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Eldean soils in the less sloping areas

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Rn—Ross silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 20 to 100 acres

Typical Profile

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

Subsoil:
 10 to 27 inches—dark brown, friable silt loam

Substratum:
 27 to 48 inches—brown and yellowish brown, friable silt loam
 48 to 66 inches—grayish brown, friable loam and silt loam
 66 to 80 inches—brown, loose very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Drainage class: Well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Occasional
Kind of water table: Apparent
Depth to the water table: 4 to 6 feet
Content of organic matter in the surface layer: 3 to 5 percent
Potential for frost action: Moderate
Available water capacity: 11.7 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 12 to 26 centimoles per kilogram in the surface layer

Composition

Ross and similar soils: 75 percent
 Inclusions: 25 percent

Inclusions

- Tremont soils in the lower positions
- Sloan soils in sloughs and oxbows

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ro—Ross silty clay loam, rarely flooded

Setting

Landform: Flood plains, stream terraces
Position on the landform: Steps on flood plains, terrace treads
Slope range: 0 to 2 percent
Size of areas: 50 to 100 acres

Typical Profile

Surface layer:
 0 to 10 inches—very dark gray, friable silty clay loam

Subsurface layer:
 10 to 27 inches—very dark gray, friable silt loam

Subsoil:
 27 to 34 inches—very dark grayish brown, friable silt loam

Substratum:

- 34 to 72 inches—brown, friable loam and gravelly sandy loam with thin strata of silty clay loam
- 72 to 80 inches—dark yellowish brown, loose very gravelly coarse sandy loam

Soil Properties and Qualities*Depth class:* Very deep (more than 60 inches)*Drainage class:* Well drained*Dominant parent material:* Alluvium*Native plant cover:* Woodland*Frequency of flooding:* Rare*Kind of water table:* Apparent*Depth to the water table:* 4 to 6 feet*Content of organic matter in the surface layer:* 3 to 5 percent*Potential for frost action:* Moderate*Available water capacity:* 9.6 inches to a depth of 60 inches or root-limiting layer*Cation-exchange capacity:* 17 to 29 centimoles per kilogram in the surface layer**Composition**

Ross and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Waupecan soils in the higher positions
- Eldean soils on low knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

RuA—Rush silt loam, 0 to 2 percent slopes**Setting***Landform:* Outwash plains, outwash terraces*Position on the landform:* Micro-highs*Size of areas:* 20 to 100 acres**Typical Profile***Surface layer:*

- 0 to 13 inches—brown, friable silt loam

Subsoil:

- 13 to 39 inches—yellowish brown and brown, friable silt loam
- 39 to 46 inches—brown, firm sandy clay loam
- 46 to 58 inches—yellowish brown, friable very gravelly sandy loam

Substratum:

- 58 to 80 inches—brown, loose very gravelly loamy coarse sand

Soil Properties and Qualities*Depth class:* Very deep (more than 60 inches)*Root zone:* Deep to sand*Drainage class:* Well drained*Dominant parent material:* Silty material or loess over outwash*Native plant cover:* Woodland*Flooding:* None*Depth to the water table:* Greater than 6 feet*Content of organic matter in the surface layer:* 0.5 to 2.0 percent*Potential for frost action:* High*Available water capacity:* 10 inches to a depth of 60 inches or root-limiting layer*Cation-exchange capacity:* 5 to 16 centimoles per kilogram in the surface layer**Composition**

Rush and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Westland soils in depressions
- Eldean soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

ScA—Savona silt loam, 0 to 2 percent slopes**Setting***Landform:* Outwash plains, outwash terraces*Position on the landform:* Micro-highs

Size of areas: 20 to 40 acres

Typical Profile

Surface layer:

0 to 10 inches—dark grayish brown, friable silt loam

Subsoil:

10 to 13 inches—yellowish brown, mottled, friable silt loam

13 to 26 inches—yellowish brown, mottled, firm silty clay loam and clay

26 to 36 inches—dark grayish brown, mottled, firm gravelly clay

36 to 47 inches—dark grayish brown and grayish brown, mottled, friable and very friable gravelly silt loam and very gravelly sandy loam

Substratum:

47 to 80 inches—grayish brown and yellowish brown, loose extremely gravelly loamy coarse sand and extremely gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Somewhat poorly drained

Dominant parent material: Outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Depth to the water table: 1.0 to 2.5 feet

Content of organic matter in the surface layer: 0.5 to 3.0 percent

Potential for frost action: High

Available water capacity: 7.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 21 centimoles per kilogram in the surface layer

Composition

Savona and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section
- “Agronomy” section
- “Recreation” section
- “Wildlife Habitat” section

- “Engineering” and “Soil Properties” sections

So—Sloan silt loam, sandy substratum, occasionally flooded

Setting

Landform: Flood plains

Position on the landform: Steps on flood plains

Slope range: 0 to 2 percent

Size of areas: 20 to 100 acres

Typical Profile

Surface layer:

0 to 10 inches—very dark gray, friable silt loam

Subsurface layer:

10 to 17 inches—black, friable silt loam

Subsoil:

17 to 23 inches—black, friable silty clay loam

23 to 31 inches—dark grayish brown, mottled, firm silty clay loam

Substratum:

31 to 56 inches—light olive brown, gray, and dark gray, mottled, friable silty clay loam and silt loam

56 to 80 inches—grayish brown, loose gravelly and very gravelly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Alluvium

Native plant cover: Woodland

Frequency of flooding: Occasional

Kind of water table: Apparent

Seasonal high water table: At the surface to 1 foot below the surface

Content of organic matter in the surface layer: 3 to 6 percent

Potential for frost action: High

Available water capacity: 11.3 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 13 to 26 centimoles per kilogram in the surface layer

Composition

Sloan and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Adrian soils in depressions and oxbows
- Ross soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

StB2—Strawn silty clay loam, 2 to 6 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 100 acres

Typical Profile

Surface layer:

0 to 6 inches—dark yellowish brown, firm silty clay loam

Subsoil:

6 to 20 inches—brown and yellowish brown, firm silty clay loam and clay loam

Substratum:

20 to 80 inches—yellowish brown, firm silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Moderate

Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Crosby soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

StC2—Strawn silty clay loam, 6 to 12 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 80 acres

Typical Profile

Surface layer:

0 to 6 inches—brown, firm silty clay loam

Subsoil:

6 to 20 inches—brown and dark yellowish brown, firm silty clay loam and clay loam

Substratum:

20 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Moderate

Available water capacity: 7.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Kokomo soils in depressions and draws
- Eldean soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

StD2—Strawn silty clay loam, 12 to 18 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders, summits

Size of areas: 10 to 60 acres

Typical Profile

Surface layer:

0 to 4 inches—brown, firm silty clay loam

Subsoil:

4 to 16 inches—brown and dark yellowish brown, firm silty clay loam and clay loam

Substratum:

16 to 80 inches—yellowish brown, firm loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Moderate

Available water capacity: 7.3 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Eldean soils on the steeper part of slopes

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

StE2—Strawn silty clay loam, 18 to 35 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Backslopes, shoulders

Size of areas: 5 to 10 acres

Typical Profile

Surface layer:

0 to 4 inches—brown, firm silty clay loam

Subsoil:

4 to 15 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:

15 to 80 inches—yellowish brown, firm loam and silt loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 2 percent

Potential for frost action: Moderate

Available water capacity: 7.2 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 18 to 22 centimoles per kilogram in the surface layer

Other features: Part of the original surface layer has been removed.

Composition

Strawn and similar soils: 100 percent

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

SuA—Strawn-Crosby complex, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Strawn—micro-highs;
Crosby—footslopes, micro-lows

Size of areas: 5 to 50 acres

Typical Profile

Strawn

Surface layer:

0 to 9 inches—brown, friable silt loam

Subsoil:

9 to 18 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:

18 to 80 inches—brown, mottled, firm loam

Crosby

Surface layer:

0 to 9 inches—grayish brown, friable silt loam

Subsoil:

9 to 25 inches—dark yellowish brown, mottled, firm clay

Substratum:

25 to 80 inches—yellowish brown, mottled, firm loam

Soil Properties and Qualities

Strawn

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Well drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: Moderate

Available water capacity: 7.8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 13 to 22 centimoles per kilogram in the surface layer

Crosby

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to compact glacial till

Drainage class: Somewhat poorly drained

Dominant parent material: Till

Native plant cover: Woodland

Flooding: None

Kind of water table: Perched

Depth to the water table: 0.5 foot to 1.5 feet

Content of organic matter in the surface layer: 1 to 3 percent

Potential for frost action: High

Available water capacity: 5.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 6 to 20 centimoles per kilogram in the surface layer

Composition

Strawn and similar soils: 55 percent

Crosby and similar soils: 30 percent

Inclusions: 15 percent

Inclusions

- Celina soils in the flatter positions
- Kokomo soils in depressions and drainageways

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

SuB—Strawn-Crosby complex, 2 to 6 percent slopes

Setting

Landform: Till plains

Position on the landform: Strawn—shoulders, summits;
Crosby—footslopes, micro-lows
Size of areas: 5 to 50 acres

Typical Profile

Strawn

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

Subsoil:
10 to 17 inches—dark yellowish brown and
yellowish brown, firm silty clay loam and clay
loam

Substratum:
17 to 80 inches—brown, mottled, firm loam

Crosby

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

Subsoil:
10 to 30 inches—yellowish brown, mottled, firm
clay

Substratum:
30 to 80 inches—yellowish brown, mottled, firm
loam

Soil Properties and Qualities

Strawn

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Well drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Depth to the water table: Greater than 6 feet
Content of organic matter in the surface layer: 1 to 3
percent
Potential for frost action: Moderate
Available water capacity: 7.7 inches to a depth of 60
inches or root-limiting layer
Cation-exchange capacity: 13 to 22 centimoles per
kilogram in the surface layer

Crosby

Depth class: Very deep (more than 60 inches)
Root zone: Moderately deep to compact glacial till
Drainage class: Somewhat poorly drained
Dominant parent material: Till
Native plant cover: Woodland
Flooding: None
Kind of water table: Perched
Depth to the water table: 0.5 foot to 1.5 feet

Content of organic matter in the surface layer: 1 to 3
percent

Potential for frost action: High

Available water capacity: 5.7 inches to a depth of 60
inches or root-limiting layer

Cation-exchange capacity: 6 to 20 centimoles per
kilogram in the surface layer

Composition

Strawn and similar soils: 55 percent

Crosby and similar soils: 30 percent

Inclusions: 15 percent

Inclusions

- Kokomo soils in depressions and draws
- Celina soils in the flatter positions

Management

For general and detailed information about
managing this map unit, see the following sections in
Part II of this publication:

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

ThA—Thackery silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Micro-highs

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:
0 to 11 inches—brown, friable silt loam

Subsoil:
11 to 16 inches—yellowish brown, mottled, firm
silty clay loam
16 to 36 inches—dark yellowish brown and brown,
mottled, firm clay loam and sandy clay loam
36 to 53 inches—brown, very friable very gravelly
sandy loam

Substratum:
53 to 80 inches—grayish brown, loose gravelly
sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to sand and gravel

Drainage class: Moderately well drained
Dominant parent material: Silty material or loess over outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Depth to the water table: 2.0 to 3.5 feet
Content of organic matter in the surface layer: 1 to 3 percent
Potential for frost action: High
Available water capacity: 8 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 8 to 21 centimoles per kilogram in the surface layer

Composition

Thackery and similar soils: 85 percent
 Inclusions: 15 percent

Inclusions

- Savona soils on low knolls
- Waynetown soils on low knolls

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Tr—Tremont silty clay loam, rarely flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 40 to 200 acres

Typical Profile

Surface layer:
 0 to 7 inches—very dark gray, firm silty clay loam

Subsurface layer:
 7 to 13 inches—very dark gray, firm clay loam

Buried soil:
 13 to 29 inches—black and very dark gray, friable and firm clay loam and loam
 29 to 54 inches—dark gray and gray, mottled, firm loam and clay loam

Substratum:
 54 to 80 inches—dark grayish brown and dark gray, loose gravelly loam and very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Moderately well drained
Dominant parent material: Alluvium
Native plant cover: Woodland
Frequency of flooding: Rare
Kind of water table: Apparent
Depth to the water table: 1.5 to 3.0 feet
Content of organic matter in the surface layer: 4 to 7 percent
Potential for frost action: High
Available water capacity: 11.1 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 20 to 24 centimoles per kilogram in the surface layer

Composition

Tremont and similar soils: 80 percent
 Inclusions: 20 percent

Inclusions

- Eldean soils on slight rises
- Westland soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ts—Tremont silt loam, occasionally flooded

Setting

Landform: Flood plains
Position on the landform: Steps on flood plains
Slope range: 0 to 2 percent
Size of areas: 50 to several hundred acres

Typical Profile

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

Subsurface layer:

9 to 18 inches—very dark grayish brown, friable silt loam

Buried soil:

18 to 28 inches—black, friable silty clay loam
28 to 40 inches—very dark gray and gray, mottled, friable silty clay loam and loam

Substratum:

40 to 80 inches—grayish brown, brown, and dark gray, friable and loose loam, coarse sandy loam, and very gravelly coarse sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Moderately well drained

Dominant parent material: Alluvium

Native plant cover: Woodland

Frequency of flooding: Occasional

Kind of water table: Apparent

Depth to the water table: 1.5 to 3.0 feet

Content of organic matter in the surface layer: 4 to 7 percent

Potential for frost action: High

Available water capacity: 11.4 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 20 to 24 centimoles per kilogram in the surface layer

Composition

Tremont and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Sloan soils in sloughs and oxbows

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ud—Udorthents, loamy**Setting**

Landform: Till plains, outwash plains

Position on the landform: Side slopes

Slope range: 0 to 2 percent

Size of areas: 15 to 60 acres

Shape of areas: Generally angular

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

General description: This map unit consists of soils in areas that have been disturbed by earth moving and grading. The remaining soil material is similar to that in the underlying material of the adjacent soils.

Composition

Udorthents and similar soils: 90 percent

Inclusions: 10 percent

Inclusions

- Relatively undisturbed soils at the edge of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Ur—Urban land**Setting**

Landform: Till plains, outwash plains

Size of areas: 80 to 120 acres

General Description

- Most areas are used for parking lots, streets, business centers, or small industrial establishments.

Composition

Urban land: 90 percent

Inclusions: 10 percent

Inclusions

- Eldean soils intermixed throughout the unit
- Miamian soils intermixed throughout the unit

Wc—Walkkill silt loam, occasionally flooded**Setting**

Landform: Flood plains

Position on the landform: Steps on flood plains

Slope range: 0 to 2 percent

Size of areas: 10 to 30 acres

Typical Profile

Surface layer:

0 to 6 inches—very dark grayish brown, friable silt loam

Subsoil:

6 to 19 inches—dark gray and dark grayish brown, mottled, friable and firm silt loam and silty clay loam

Underlying organic soil:

19 to 53 inches—black and very dark brown, friable sapric material

Substratum of underlying soil:

53 to 80 inches—dark gray and gray, very friable, firm, and loose gravelly loam and very gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Restricted by seasonal high water table

Drainage class: Very poorly drained

Dominant parent material: Alluvium over organic material over outwash

Native plant cover: Woodland

Frequency of flooding: Occasional

Kind of water table: Apparent

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface

Ponding duration: Very long

Content of organic matter in the surface layer: 4 to 12 percent

Potential for frost action: High

Available water capacity: 19.8 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 14 to 40 centimoles per kilogram in the surface layer

Other features: Buried soil layers

Composition

Wallkill and similar soils: 80 percent

Inclusions: 20 percent

Inclusions

- Carlisle soils in swamps
- Sloan soils in depressions and oxbows

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

- “Woodland” section

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

WeA—Warsaw silt loam, 0 to 3 percent slopes

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Footslopes, micro-highs

Size of areas: 10 to 100 acres

Typical Profile

Surface layer:

0 to 12 inches—very dark grayish brown, friable silt loam

Subsoil:

12 to 22 inches—brown and dark yellowish brown, friable and firm silty clay loam and clay loam

22 to 32 inches—brown and dark brown, firm and friable gravelly clay loam

32 to 36 inches—dark brown, friable gravelly sandy loam

Substratum:

36 to 80 inches—brown, loose very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Moderately deep to sand and gravel

Drainage class: Well drained

Dominant parent material: Outwash

Native plant cover: Prairie grasses

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 2 to 5 percent

Potential for frost action: Moderate

Available water capacity: 7.1 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 10 to 25 centimoles per kilogram in the surface layer

Composition

Warsaw and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Eldean soils on slight rises
- Savona soils in swales and depressions
- Waupecan soils in the higher positions

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

WpA—Waupecan silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Micro-highs

Size of areas: 30 to 100 acres

Typical Profile

Surface layer:

0 to 13 inches—very dark grayish brown, friable silt loam

Subsurface layer:

13 to 17 inches—very dark grayish brown, friable silt loam

Subsoil:

17 to 35 inches—yellowish brown, firm silty clay loam

35 to 48 inches—dark yellowish brown and brown, firm clay loam and sandy clay loam

Substratum:

48 to 80 inches—brown and dark yellowish brown, loose gravelly loamy coarse sand and very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Root zone: Deep to sand and gravel

Drainage class: Well drained

Dominant parent material: Silty material or loess over outwash

Native plant cover: Prairie grasses

Flooding: None

Depth to the water table: Greater than 6 feet

Content of organic matter in the surface layer: 4 to 5 percent

Potential for frost action: High

Available water capacity: 9.6 inches to a depth of 60 inches or root-limiting layer

Cation-exchange capacity: 17 to 26 centimoles per kilogram in the surface layer

Composition

Waupecan and similar soils: 85 percent

Inclusions: 15 percent

Inclusions

- Warsaw soils in the higher positions
- Waynetown soils along the margins of the unit

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

WrA—Waynetown silt loam, 0 to 2 percent slopes

Setting

Landform: Outwash plains, outwash terraces

Position on the landform: Footslopes, micro-highs

Size of areas: 5 to 40 acres

Typical Profile

Surface layer:

0 to 11 inches—dark grayish brown, friable silt loam

Subsoil:

11 to 34 inches—yellowish brown, mottled, firm silty clay loam

34 to 45 inches—grayish brown, mottled, firm clay loam

45 to 66 inches—dark gray and dark grayish brown, firm and friable gravelly loam and gravelly sandy loam

Substratum:

66 to 80 inches—gray, loose very gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)

Drainage class: Somewhat poorly drained

Dominant parent material: Silty material over loamy outwash

Native plant cover: Woodland

Flooding: None

Kind of water table: Apparent

Depth to the water table: 0.5 foot to 2.0 feet

Content of organic matter in the surface layer: 0.5 to 2.0 percent
Potential for frost action: High
Available water capacity: 10.2 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 5 to 16 centimoles per kilogram in the surface layer

Composition

Waynetown and similar soils: 80 percent
 Inclusions: 20 percent

Inclusions

- Drummer soils in depressions and drainageways
- Thackery soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

Wt—Westland silty clay loam

Setting

Landform: Outwash plains, outwash terraces
Position on the landform: Footslopes, open depressions, drainageways
Slope range: 0 to 2 percent
Size of areas: 10 to several hundred acres

Typical Profile

Surface layer:
 0 to 11 inches—very dark gray, firm silty clay loam
Subsoil:
 11 to 35 inches—dark gray and grayish brown, mottled, firm silty clay loam and loam

35 to 51 inches—dark gray, friable gravelly loam

Substratum:

51 to 80 inches—dark grayish brown, loose very gravelly coarse sand and loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep (more than 60 inches)
Root zone: Restricted by seasonal high water table
Drainage class: Very poorly drained
Dominant parent material: Silty material over outwash
Native plant cover: Woodland
Flooding: None
Kind of water table: Apparent
Seasonal high water table: 1 foot above to 1 foot below the surface
Ponding duration: Very long
Content of organic matter in the surface layer: 2 to 5 percent
Potential for frost action: High
Available water capacity: 8.4 inches to a depth of 60 inches or root-limiting layer
Cation-exchange capacity: 15 to 31 centimoles per kilogram in the surface layer

Composition

Westland and similar soils: 90 percent
 Inclusions: 10 percent

Inclusions

- Savona soils on slight rises
- Waynetown soils on slight rises

Management

For general and detailed information about managing this map unit, see the following sections in Part II of this publication:

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

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; 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.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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.

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 shatter or loosen hard, compacted layers to a depth below normal plow depth.

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 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 or 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.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric

layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

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.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

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.

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, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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 wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

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.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

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.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry 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.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Footslope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving

crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or

unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

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

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Kame terrace. A terracelike 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.

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. They appear as rounded or elliptical volumes of various sizes. They may have colors contrasting (light or dark) with those of the layer in which they appear, and their texture and structure may be unlike those of the soil around them.

Lacustrine deposit. 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 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.
- 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 fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.
- Moraine.** An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.
- Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
- Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).
- Muck.** Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)
- Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
- Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)
- Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
- Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:
- | | |
|----------------------|-----------------------|
| Very low | less than 0.5 percent |
| Low | 0.5 to 1.0 percent |
| Moderately low | 1.0 to 2.0 percent |
| Moderate | 2.0 to 4.0 percent |
| High | 4.0 to 8.0 percent |
| Very high | more than 8.0 percent |
- Outwash plain.** A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.
- 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 movement of water through the soil.
- Percs slowly** (in tables). The slow movement of water through the soil adversely affects the specified use.
- Permeability.** The quality of the soil that enables water or air to move downward through the profile. The

rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a

soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Recessional moraine. A moraine formed during a temporary but significant halt in the retreat of a glacier.

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 generally is 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.
- 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.
- 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. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.
- Shale.** Sedimentary rock formed by the hardening of a clay deposit.
- Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.
- Shoulder.** The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope 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.
- 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.
- Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor produced during a former stage of erosion or deposition.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion 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 a hardpan or claypan.

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. 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.”

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 generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The outermost inclined surface at the base of a hill; part of a footslope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Upland. 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.

Variation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

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 oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation
(Recorded in the period 1961-90 at Springfield, Ohio)

Month	Temperature						Precipitation					
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	2 years in 10 will have--			Average number of days with 0.10 inch or more	Average snowfall In	
				Maximum temperature higher than--	Minimum temperature lower than--		Less than--	More than--	In			In
°F	°F	°F	°F	°F	Units	In	In	In	In	In		
January----	33.4	16.1	24.7	62	-15	11	2.12	1.12	3.00	5	2.2	
February---	37.2	18.1	27.7	66	-10	25	1.84	.84	2.69	4	4.1	
March-----	48.8	28.7	38.7	77	2	121	2.63	1.67	3.49	6	.4	
April-----	60.4	38.0	49.2	85	18	304	3.25	1.94	4.42	7	.1	
May-----	71.4	48.4	59.9	88	29	619	4.25	2.48	5.83	8	.0	
June-----	80.1	58.1	69.1	92	40	866	4.26	2.62	5.74	7	.0	
July-----	83.8	61.9	72.9	95	47	1,017	4.13	2.34	5.72	7	.0	
August-----	82.4	59.5	70.9	94	44	951	3.88	1.96	5.54	6	.0	
September--	75.9	51.8	63.9	91	33	714	2.95	1.45	4.25	5	.0	
October----	63.6	40.0	51.8	83	21	373	2.69	1.56	3.69	5	.1	
November---	50.7	32.4	41.6	74	11	153	3.07	1.61	4.35	6	.4	
December---	39.2	22.9	31.0	65	-6	40	2.76	1.55	3.83	6	2.3	
Yearly:												
Average---	60.6	39.7	50.1	---	---	---	---	---	---	---	---	
Extreme---	100	-26	---	96	-17	---	---	---	---	---	---	
Total-----	---	---	---	---	---	5,194	37.82	31.72	42.81	72	9.5	

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall
(Recorded in the period 1961-90 at Springfield, Ohio)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 19	Apr. 30	May 14
2 years in 10 later than--	Apr. 15	Apr. 26	May 9
5 years in 10 later than--	Apr. 7	Apr. 19	Apr. 29
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 14	Oct. 2	Sept. 27
2 years in 10 earlier than--	Oct. 20	Oct. 8	Sept. 30
5 years in 10 earlier than--	Oct. 30	Oct. 20	Oct. 7

Table 3.--Growing Season

(Recorded in the period 1961-90 at Springfield, Ohio)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	185	161	141
8 years in 10	192	168	148
5 years in 10	205	182	160
2 years in 10	218	196	172
1 year in 10	224	203	178

Table 4.--Classification of the Soils

(This classification does not include recent amendments to soil taxonomy for cation-exchange activity, particle-size modifier, and dual mineralogy for strongly contrasting classes. More detailed information is available at local offices of the Natural Resources Conservation Service)

Soil name	Family or higher taxonomic class
Adrian-----	Terric Medisaprists, sandy or sandy-skeletal, mixed, euic, mesic
Carlisle-----	Typic Medisaprists, euic, mesic
Casco-----	Typic HapludalFs, fine-loamy over sandy or sandy-skeletal, mixed, mesic
Celina-----	Aquic HapludalFs, fine, mixed, mesic
Crosby-----	Aeric OchraqualFs, fine, mixed, mesic
Donnelville-----	Eutrochreptic Rendolls, loamy-skeletal, carbonatic, mesic
Drummer-----	Typic Haplaquolls, fine-silty, mixed, mesic
Eldean-----	Typic HapludalFs, fine, mixed, mesic
Genesee-----	Fluventic Eutrochrepts, fine-loamy, mixed, mesic
Kokomo-----	Typic Argiaquolls, fine, mixed, mesic
Linwood-----	Terric Medisaprists, loamy, mixed, euic, mesic
Lippincott-----	Typic Argiaquolls, fine, mixed, mesic
Miamian-----	Typic HapludalFs, fine, mixed, mesic
Milford-----	Typic Haplaquolls, fine, mixed, mesic
Millsdale-----	Typic Argiaquolls, fine, mixed, mesic
Milton-----	Typic HapludalFs, fine, mixed, mesic
Ockley-----	Typic HapludalFs, fine-loamy, mixed, mesic
Patton-----	Typic Haplaquolls, fine-silty, mixed, mesic
Randolph-----	Aeric OchraqualFs, fine, mixed, mesic
Rodman-----	Typic Hapludolls, sandy-skeletal, mixed, mesic
Ross-----	Cumulic Hapludolls, fine-loamy, mixed, mesic
Rush-----	Typic HapludalFs, fine-silty, mixed, mesic
Savona-----	Aeric OchraqualFs, fine, mixed, mesic
Sloan-----	Fluvaquentic Haplaquolls, fine-loamy, mixed, mesic
Strawn-----	Typic HapludalFs, fine-loamy, mixed, mesic
Thackery-----	Aquic HapludalFs, fine-loamy, mixed, mesic
Tremont-----	Cumulic Haplaquolls, fine-loamy, mixed (calcareous), mesic
Udorthents-----	Typic Udorthents, fine-loamy, mixed, mesic
Wallkill-----	Thapto-Ristic Fluvaquents, fine-loamy, mixed, nonacid, mesic
Warsaw-----	Typic Argiudolls, fine-loamy over sandy or sandy-skeletal, mixed, mesic
Waupecan-----	Typic Argiudolls, fine-silty, mixed, mesic
Waynetown-----	Aeric OchraqualFs, fine-silty, mixed, mesic
Westland-----	Typic Argiaquolls, fine-loamy, mixed, mesic

Table 5.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Ad	Adrian muck, drained-----	803	0.3
Ae	Adrian muck, undrained-----	247	*
Ca	Carlisle muck, drained-----	125	*
Cb	Carlisle muck, undrained-----	509	0.2
CcD2	Casco gravelly loam, 12 to 20 percent slopes, eroded-----	534	0.2
CeA	Celina silt loam, 0 to 2 percent slopes-----	6,546	2.5
CeB	Celina silt loam, 2 to 6 percent slopes-----	5,569	2.2
ChA	Celina-Strawn complex, 0 to 2 percent slopes-----	2,518	1.0
ChB	Celina-Strawn complex, 2 to 6 percent slopes-----	4,553	1.8
CrA	Crosby silt loam, 0 to 2 percent slopes-----	20,979	8.2
CrB	Crosby silt loam, 2 to 6 percent slopes-----	632	0.2
DoE	Donnelsville channery silt loam, 18 to 30 percent slopes-----	239	*
DpF	Donnelsville-Rock outcrop complex, 30 to 70 percent slopes-----	280	0.1
Dr	Drummer silty clay loam, gravelly substratum-----	3,733	1.5
EmA	Eldean silt loam, 0 to 2 percent slopes-----	9,310	3.6
EmB	Eldean silt loam, 2 to 6 percent slopes-----	5,442	2.1
EmB2	Eldean silt loam, 2 to 6 percent slopes, eroded-----	1,517	0.6
EmC2	Eldean silt loam, 6 to 12 percent slopes, eroded-----	778	0.3
EnC2	Eldean-Casco complex, 6 to 12 percent slopes, eroded-----	311	0.1
EpB2	Eldean-Miamian complex, 2 to 6 percent slopes, eroded-----	3,305	1.3
EpC2	Eldean-Miamian complex, 6 to 12 percent slopes, eroded-----	6,206	2.4
EpC3	Eldean-Miamian complex, 6 to 12 percent slopes, severely eroded-----	1,236	0.5
EpD2	Eldean-Miamian complex, 12 to 18 percent slopes, eroded-----	3,355	1.3
EpD3	Eldean-Miamian complex, 12 to 18 percent slopes, severely eroded-----	550	0.2
EpE2	Eldean-Miamian complex, 18 to 30 percent slopes, eroded-----	580	0.2
EsE3	Eldean-Rodman complex, 18 to 30 percent slopes, severely eroded-----	212	*
EuB	Eldean-Urban land complex, 2 to 6 percent slopes-----	1,655	0.6
EuC	Eldean-Urban land complex, 6 to 12 percent slopes-----	697	0.3
Ge	Genesee silt loam, till substratum, rarely flooded-----	246	*
Gn	Genesee silt loam, till substratum, occasionally flooded-----	1,637	0.6
Ko	Kokomo silty clay loam-----	37,430	14.6
Lg	Linwood muck, undrained-----	166	*
Lh	Linwood mucky silt loam, drained-----	809	0.3
Lm	Lippincott mucky silt loam-----	616	0.2
Lp	Lippincott silty clay loam-----	8,655	3.4
Lu	Lippincott-Urban land complex-----	237	*
MgB2	Miamian silty clay loam, limestone substratum, 2 to 6 percent slopes, eroded--	496	0.2
MgC2	Miamian silty clay loam, limestone substratum, 6 to 12 percent slopes, eroded--	102	*
MgE2	Miamian silty clay loam, limestone substratum, 18 to 30 percent slopes, eroded	190	*
MhA	Miamian silt loam, 0 to 2 percent slopes-----	3,888	1.5
MhB	Miamian silt loam, 2 to 6 percent slopes-----	20,418	7.9
MhB2	Miamian silt loam, 2 to 6 percent slopes, eroded-----	5,122	2.0
MhC	Miamian silt loam, 6 to 12 percent slopes-----	1,406	0.5
MhC2	Miamian silt loam, 6 to 12 percent slopes, eroded-----	949	0.4
MhD2	Miamian silt loam, 12 to 18 percent slopes, eroded-----	394	0.2
MhE	Miamian silt loam, 18 to 30 percent slopes-----	773	0.3
MhE2	Miamian silt loam, 18 to 30 percent slopes, eroded-----	683	0.3
MkB2	Miamian silty clay loam, 2 to 6 percent slopes, eroded-----	7,892	3.1
MkC2	Miamian silty clay loam, 6 to 12 percent slopes, eroded-----	5,201	2.0
MkD2	Miamian silty clay loam, 12 to 18 percent slopes, eroded-----	1,230	0.5
MmC3	Miamian clay loam, 6 to 12 percent slopes, severely eroded-----	2,719	1.1
MmD3	Miamian clay loam, 12 to 18 percent slopes, severely eroded-----	871	0.3
MmE3	Miamian clay loam, 18 to 30 percent slopes, severely eroded-----	663	0.3
MnB	Miamian-Urban land complex, 2 to 6 percent slopes-----	2,635	1.0
MnC	Miamian-Urban land complex, 6 to 12 percent slopes-----	245	*
Mo	Milford silty clay loam, sandy substratum-----	2,293	0.9
Ms	Millsdale silty clay loam-----	1,215	0.5
MtA	Milton silt loam, 0 to 2 percent slopes-----	463	0.2
MtB	Milton silt loam, 2 to 6 percent slopes-----	877	0.3
MvC2	Milton silty clay loam, 6 to 12 percent slopes, eroded-----	500	0.2
MxB	Milton-Urban land complex, 2 to 6 percent slopes-----	469	0.2
OcA	Ockley silt loam, 0 to 2 percent slopes-----	5,044	2.0

See footnote at end of table.

Table 5.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
OcB	Ockley silt loam, 2 to 6 percent slopes-----	641	0.2
Pa	Patton silty clay loam-----	530	0.2
Pg	Pits, gravel-----	530	0.2
Ph	Pits, quarry-----	182	*
RaA	Randolph silt loam, 0 to 2 percent slopes-----	350	0.1
RgE	Rodman gravelly loam, 18 to 35 percent slopes-----	1,845	0.7
Rn	Ross silt loam, occasionally flooded-----	2,385	0.9
Ro	Ross silty clay loam, rarely flooded-----	690	0.3
RuA	Rush silt loam, 0 to 2 percent slopes-----	1,756	0.7
ScA	Savona silt loam, 0 to 2 percent slopes-----	844	0.3
So	Sloan silt loam, sandy substratum, occasionally flooded-----	5,676	2.2
StB2	Strawn silty clay loam, 2 to 6 percent slopes, eroded-----	9,246	3.6
StC2	Strawn silty clay loam, 6 to 12 percent slopes, eroded-----	5,650	2.2
StD2	Strawn silty clay loam, 12 to 18 percent slopes, eroded-----	1,408	0.5
StE2	Strawn silty clay loam, 18 to 35 percent slopes, eroded-----	37	*
SuA	Strawn-Crosby complex, 0 to 2 percent slopes-----	2,355	0.9
SuB	Strawn-Crosby complex, 2 to 6 percent slopes-----	1,421	0.6
ThA	Thackery silt loam, 0 to 2 percent slopes-----	1,259	0.5
Tr	Tremont silty clay loam, rarely flooded-----	1,398	0.5
Ts	Tremont silt loam, occasionally flooded-----	2,684	1.0
Ud	Udorthents, loamy-----	1,443	0.6
Ur	Urban land-----	1,176	0.5
W	Water-----	3,595	1.4
Wc	Wallkill silt loam, occasionally flooded-----	258	0.1
WeA	Warsaw silt loam, 0 to 3 percent slopes-----	1,168	0.5
WpA	Waupecan silt loam, 0 to 2 percent slopes-----	1,226	0.5
WrA	Waynetown silt loam, 0 to 2 percent slopes-----	989	0.4
Wt	Westland silty clay loam-----	7,186	2.8
	Total-----	256,883	100.0

* Less than 0.05 percent. The combined extent of the soils assigned an asterisk in the "Percent" column is about 0.9 percent of the survey area.

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