United States
Department of
Agriculture

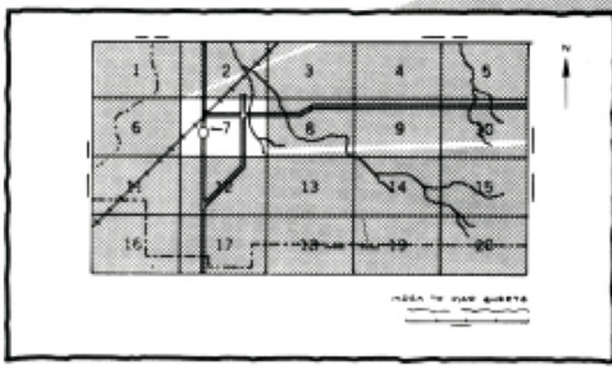
Soil
Conservation
Service

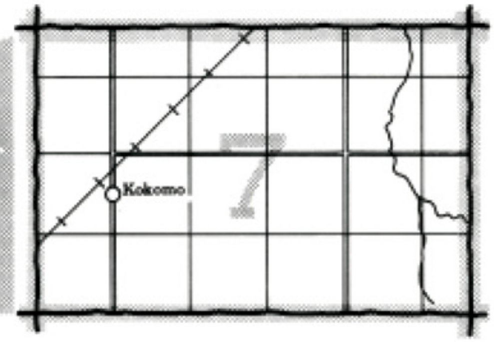
In cooperation with
United States Department of
Agriculture, Forest Service;
the Ohio Department of
Natural Resources,
Division of Soil and Water
Conservation; and the
Ohio Agricultural Research
and Development Center

Soil Survey of Scioto County, Ohio

HOW TO USE

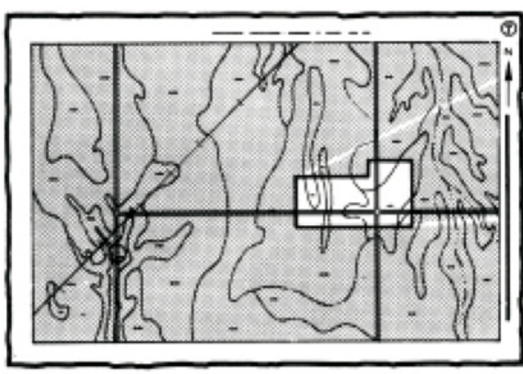
1. Locate your area of interest on the "Index to Map Sheets"

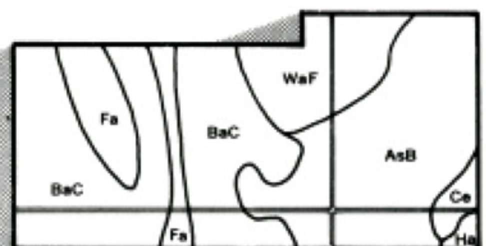




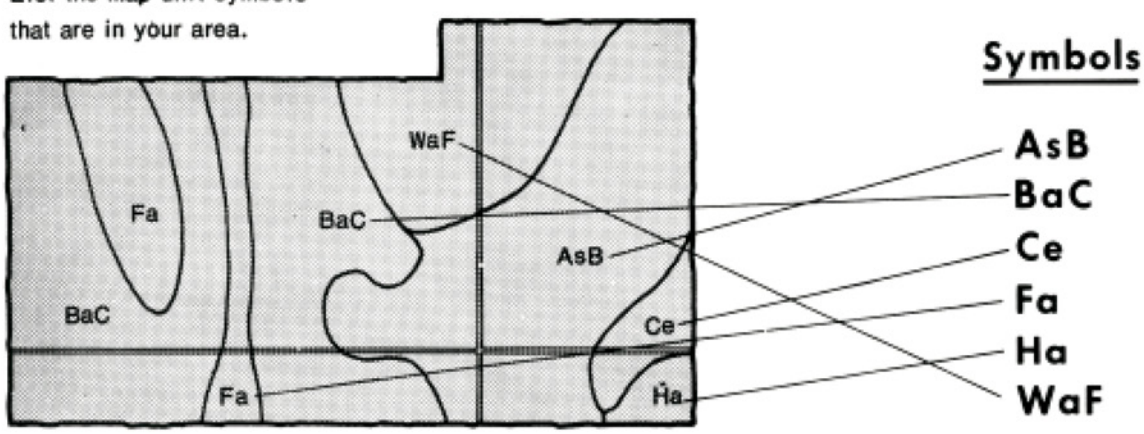
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



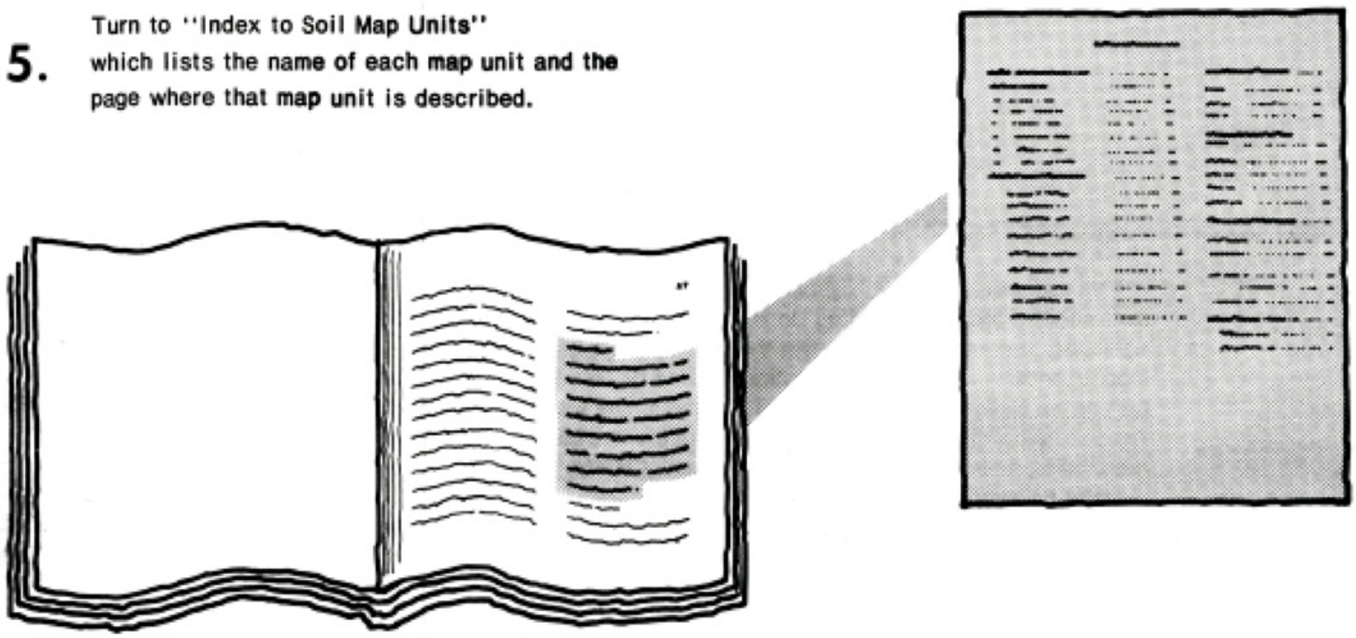


4. List the map unit symbols that are in your area.

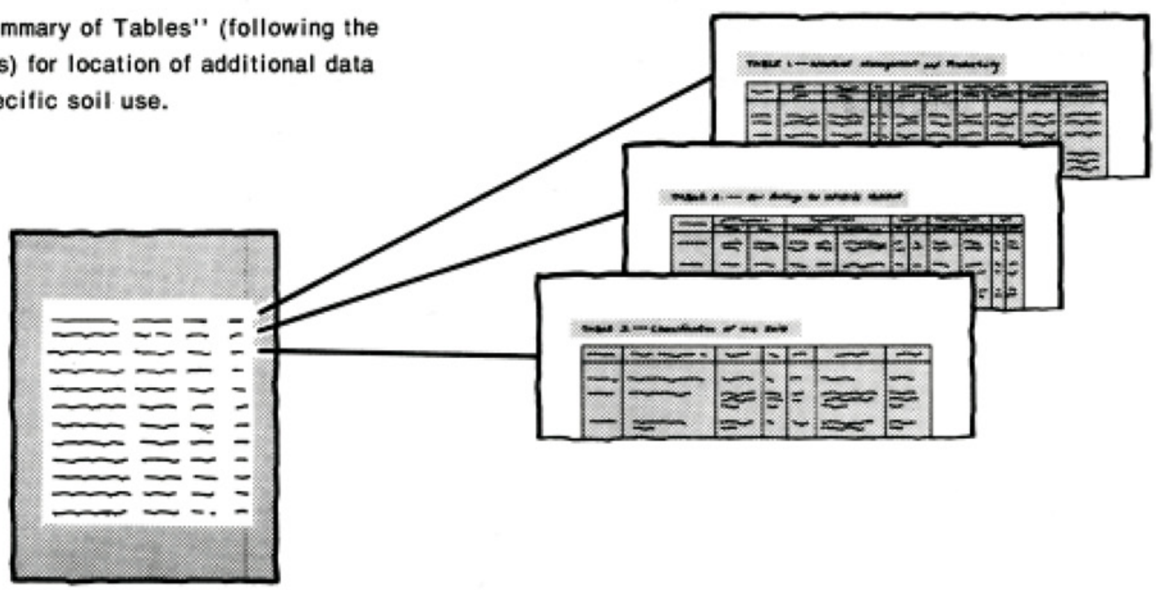


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and Forest Service; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the Ohio Agricultural Research and Development Center. It is part of the technical assistance furnished to the Scioto Soil and Water Conservation District. Some funds were provided by the Scioto County Commissioners.

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

Cover: An area of the Shelocta-Brownsville association, very steep, which is used mainly as woodland.

Contents

Soil Series

January 1989

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Scioto 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 water table near the surface 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 Soil Conservation Service or the Cooperative Extension Service.

Joseph C. Branco
State Conservationist
Soil Conservation Service

Soil Survey of Scioto County, Ohio

By F.E. McCleary, M.M. Feusner, and S.J. Hamilton, Ohio Department of Natural Resources, Division of Soil and Water Conservation

Fieldwork by F.E. McCleary, M.M. Feusner, S.J. Hamilton, and K.E. Miller, Ohio Department of Natural Resources, Division of Soil and Water Conservation

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with the Ohio Department of Natural Resources, Division of Soil and Water Conservation, and the Ohio Agricultural Research and Development Center

General Nature of the County

SCIOTO COUNTY is in the south-central part of Ohio (fig. 1). It is bordered by Adams County on the west, Pike County on the north, Jackson County on the northeast, Lawrence County on the east, and the Ohio River on the south. The total area in the county, excluding bodies of water larger than 40 acres, is 389,184 acres, or about 608 square miles.

In 1980, the county had a population of 84,545 and Portsmouth, the county seat and only city, had a population of 25,943. New Boston, Otway, Rarden, and South Webster are incorporated villages within the county. Other villages include Lucasville, West Portsmouth, and Wheelersburg.

In 1967, about 65 percent of the acreage in the county was woodland, 15 percent was cropland, 8 percent was pasture, and 12 percent was used for other purposes (*14*). The acreage of farmland has decreased in recent years, particularly along the stream valleys, because of increased development for transportation, industrial, residential, recreational, and other nonfarm uses. Cash crops and livestock are the major farm products. Soybeans, corn, vegetables, and tobacco are the chief cash crops. Dairy cows, beef cattle, and poultry are the dominant kinds of livestock. Wood pulp and timber are important forest products.

Figure 1.—Location of Scioto County in Ohio.

Most of the soils in Scioto County are well drained or moderately well drained. Many are productive, but much of the county is moderately steep to very steep. Slope and control of erosion are the major concerns in managing the soils for farm and many nonfarm uses. Flooding is a serious management concern on flood plains, and a drainage system is needed in a few wet areas.

This soil survey updates the survey of Scioto County published in 1940 (*9*). It is a detailed soil survey on aerial photography and gives more information about soil interpretations.

History and Development

The earliest known inhabitants of this survey area were the Mound Builders (*10*). Present-day Portsmouth was the site of their burial grounds and of their ritualistic campfires. The survey area was occupied by the Wyandots (called the Hurons by the French), by the Delawares and Chippewas, and finally by the Shawnees, a warlike tribe that moved up from the south.

In 1790, French natives, seeking to improve their lot, were induced by a group of speculators operating in Paris to emigrate to the United States for the purpose of establishing a settlement in the Northwest Territory. The land sold to these people was represented as being cleared and settled. Actually, the company making this representation held no title to the land as claimed. The French emigrants learned of the fraud upon their arrival in America, and some immediately returned to their homeland. To relieve the distress of those who remained, Congress, on March 3, 1795, granted these people 24,000 acres of land in what is now Green Township in Scioto County.

Prior to 1803, the survey area was in the Northwest Territory. It was part of both Washington and Adams Counties. Ohio's first legislature was convened on March 3, 1803. On March 24, the legislature formally passed an act creating Scioto County. The county boundaries originally included an area much larger than the present county.

The junction of the Scioto and Ohio Rivers was important in the early exploration of this region. The early settlers came by way of the Ohio River from Pennsylvania, New York, Virginia, and New England.

The village of Alexandria, which had been the site of an Indian village known as Lower Shawnee Town, was surveyed in 1787 and platted in 1799. It was designated as the temporary county seat after Scioto County was established. Settlers were threatened annually by floodwater from the Ohio and Scioto Rivers, as had been their Shawnee predecessors, and were especially discouraged by two floods in 1808. The inhabitants moved to higher ground that had been platted on the east bank of the Scioto River, at its confluence with the Ohio River. The new town was named Portsmouth, after Portsmouth, New Hampshire. It was laid out in 1803 and was incorporated in 1815. It became a city of importance, whereas Alexandria soon ceased to exist.

Steamboats, plying the broad expanses of the Ohio, docked at the wharves at the foot of what is now Market Street in Portsmouth. Thus, in 1810, these boats initiated the economic development of the city. From that year until transportation by canal and river was largely supplanted by railroads, Portsmouth was the center of a large network of river and canal traffic. The Ohio & Erie Canal, begun in 1825 and completed in 1832, linked Portsmouth with Cleveland. Portsmouth became a city in 1851. After the advent of the railroad in 1853, Portsmouth and Scioto County became important in the world of commerce and industry.

Farming

In 1982, Scioto County had 740 farms and 117,000 acres of farmland. The acreage of farmland has decreased in recent years, however, because of urban or recreational development, especially along stream valleys. The number of farms decreased from 760 in 1980 to 740 in 1982, but the average size of the farms increased by 5 acres (*7, 8*).

By percentage of the total cash receipts from farm marketing, the major commodities in Scioto County in 1979 were dairy products, 21 percent; cattle, 16 percent; soybeans, 15 percent; poultry, 14 percent; corn, 13 percent; tobacco, 6 percent; vegetables, 6 percent; and forest products, 2 percent (*4*). In 1982, the principal kinds and numbers of livestock were cattle and calves, 13,200; hogs and pigs, 1,900; and chickens, 75,000 egg-laying hens and pullets (*8*).

Industry

Industry in Scioto County grew because of the forests and an ample supply of iron ore. The eastern part of the county was mined for iron ore from the 1820's to the 1850's. The area around South Webster was mined not only for iron ore but also for clay, which was used in the manufacture of tile, firebrick, and paving brick. The clay also was used in the molds for old furnaces (*15*).

Sandstone was quarried in the western part of the county, at Buena Vista, Henley, McDermott, and Rarden. The Buena Vista member of the Cuyahoga Formation (also called City Ledge) was quarried at Buena Vista and Rarden and is still quarried at McDermott. At Henley, sandstone has been quarried from four horizons in the Waverly Formation, from the upper part of the Bedford Formation, and from Berea grit. The Buena Vista, Henley, and Rarden quarries were active until about 1910 (*12*). Sand and gravel on the bottom land and terraces along the Scioto and Ohio Rivers have been mined for many years.

In the past the county had several industries that employed many workers. It had three shoe factories; a number of foundries; plants that manufactured clay products, including paving bricks; and a steel mill.

Portsmouth had one of the largest railroad yards in the state. This yard has eliminated most of its operations. The last of the shoe factories closed in 1976. The steel mill closed in May of 1981, but a plant that provided fuel for the mill is still in operation. A plant that manufactured firebrick and other clay products closed in March of 1983.

A manufacturer of shoelaces and industrial braids currently employs the largest number of people in the county. A major industry in the eastern part of the county produces polystyrene and phenol acetone alcohols. A manufacturer of gray iron castings is the last of the major foundries in the county.

Water Supply

The valleys of the Ohio and Scioto Rivers are good sources of water in Scioto County. Water is obtained from the streams and from the sand and gravel deposits. The water supply is limited in other parts of the county because the underlying layers of shale or siltstone bedrock are poor aquifers. Rural water systems serve most of the county.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

At the higher elevations in Scioto County, winters are cold and snowy. In the valleys, they also are frequently cold, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on the ridgetops and very warm in the valleys. Very hot days occasionally occur in the valleys. Rainfall is evenly distributed throughout the year, but it is appreciably heavier on the windward, west-facing slopes than in the valleys. The normal annual precipitation is adequate for all crops. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in the narrow valleys.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Portsmouth in the period 1951 to 1980. 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 34 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Portsmouth on January 8, 1977, is -20 degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on July 15, 1954, is 105 degrees.

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

Of the total annual precipitation, about 23 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 6.4 inches at Portsmouth on September 6, 1976. Thunderstorms occur on about 42 days each year.

The average seasonal snowfall is about 18 inches. The greatest snow depth at any one time during the period of record was 22 inches. On the average, 12 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 11 miles per hour, in spring.

Physiography, Relief, and Drainage

Scioto County is on the unglaciated Allegheny Plateau. The landscape consists of hills, narrow and wide ridgetops, and stream valleys. In the southwestern and northwestern parts of the county, the landscape is strongly dissected and slopes are dominantly steep or very steep. The ridgetops in the southwestern part are at elevations of 1,000 to 1,200 feet and are very narrow. The stream valleys also are very narrow. The ridgetops in the northwestern part of the county are at elevations of 1,100 to 1,300 feet. The ridgetops and stream valleys are wider than those in the southwestern part.

Two wide valleys extend across the county from north to south. The valley of the Scioto River is 1.5 to 2.0 miles wide. Terrace remnants of earlier valleys, at elevations higher than those of the bottom land along the Scioto River, are in various places on either side of the Scioto River and in areas along the Ohio River southwest of Portsmouth. In the area between the valley of the Scioto River and the Teays Valley (California Valley), the landscape is strongly dissected and slopes are dominantly very steep. The ridgetops in the valley of the Scioto River are narrow. To the east, toward the Teays Valley, the slopes become less steep and the ridgetops are wider.

The Teays Valley, which is 1 to 2 miles wide, is in the east-central part of the county. It extends from Stockdale, directly north of the county line, past Minford and Slocums and to Wheelersburg, where it joins the Ohio River Valley. No large stream crosses the Teays Valley, but the Little Scioto River crosses it in several places. The valley floor is more than 100 feet above the Ohio River Valley. Evidently, the drainage of the Teays Valley was northward in preglacial times. Because of glaciation, however, the drainage outlet was obstructed. A ponded condition developed, and the valley was filled with silt and clay and subsequently was abandoned by streams as the Ohio River formed. Remnants of this valley can be traced up the Ohio River as far as Ironton, where the valley joined the old Teays Valley of West Virginia. The land east of the Teays Valley is rolling, is not so steep as the land to the west, and has ridgetops at elevations of about 900 feet. Part of this region has relief more favorable for agriculture than the rest of the county (*17*).

All of the streams in the county drain directly or indirectly into the Ohio River. Most of those in the western part drain initially into Scioto Brush Creek and then into the Scioto River. Some streams drain directly into the Ohio River. Those in the central part of the county drain into the Scioto River and the Little Scioto River. Those in the eastern part drain into Pine Creek and then into the Ohio River.

Elevation in the county ranges from 464 feet above sea level in an area along the Adams-Scioto county line to 1,338 feet in an area southeast of Mount Joy. The bottom land along the Scioto River has an elevation of 500 to 550 feet. The terraces along the Ohio River are at about 540 to 550 feet. The ridges of the dissected uplands have an average elevation of about 1,000 to 1,050 feet, and the floor of the Teays Valley is at 650 to 700 feet (*9*).

Bedrock Geology

Scioto County lies within the Kanawha section of the Appalachian Plateaus province. The Allegheny Plateau extends from Lawrence County, through Scioto County, and into Adams County. The bedrock in Scioto County consists of Pennsylvanian, Mississippian, and Devonian Systems. The Pottsville and Allegheny Groups represent the Pennsylvanian System, the Waverly Group represents the Mississippian System, and Ohio shale represents the Devonian System.

About 42 percent of the Pottsville Group is sandstone. The rest of the strata consist of acid shale and clay that have thin seams of coal, iron ore, and limestone. The Pennsylvanian System contains commercially important raw materials, including some gas and petroleum (*18*).

The bedrock in most of the county is of the Waverly Group. This group consists of shale, sandstone, and conglomerate material deposited in shallow water close to an ancient shoreline. Marked variations in the character of the strata in both horizontal and vertical directions are the result of a change in the shoreline or in climate conditions, which frequently shifted the zone of deposition. The thickness of the rock varies considerably, partly because of differences in the amount of rock deposited and partly because of erosion and the removal of rock strata preceding deposition of the next rock layer (*12*).

Ohio shale is the least extensive bedrock in the county. It consists of black, acid, fissile shale on the middle and lower slopes near Henley and the western county line.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; 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 biologic activity.

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

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-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, acidity, 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. 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 interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were 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 were 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 state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure 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.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. 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 soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns 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 (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils 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 onsite investigation is needed to plan for intensive uses in small areas.

Survey Procedures

The general procedures followed in making this survey are described in the National Soils Handbook of the Soil Conservation Service. The survey of the county published in 1940 (*9*) and the soil maps made for conservation planning on individual farms prior to the start of the project soil survey were among the references used.

Before actual fieldwork began, preliminary boundaries of slopes and landforms on dissected woodland were plotted stereoscopically on aerial photographs taken in 1974 at a scale of 1:40,000 and enlarged to a scale of 1:15,840. U.S. Geologic Survey topographic maps at a scale of 1:24,000 helped the soil scientists to relate land and image features.

The soil scientists traversed the landscape on foot, examining the soils. In areas of the Omulga-Monongahela-Haymond map unit and in other areas where the soil pattern is very complex, the traverses were made at intervals as close as 200 yards. In areas of the Shelocta-Brownsville map unit and in other areas used primarily as woodland, the traverses were about a half mile apart.

As the traverses were made, the soil scientists divided the landscape into segments in which land use and management of the soil differed. For example, a hillside was separated from a swale and a gently sloping ridgetop from a very steep side slope. In most areas soil examinations along the traverses were made at intervals of 50 to 800 yards, depending on the landscape and soil pattern. Observations of such items as landforms, blown down trees, vegetation, roadbanks, and animal burrows 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 with the aid of a hand auger or a spade to a depth of about 4 feet or to bedrock within a depth of 4 feet. The pedons described as typical were observed and studied in pits that were dug with shovels, mattocks, and digging bars to a depth of 6 feet.

At the beginning of the survey, sample blocks were selected to represent the major landscapes in the county. These were mapped at a rate roughly half of that used in the remainder of the county. Extensive notes were taken on the composition of the map units in these preliminary study areas. As mapping progressed, these preliminary notes were modified and a final assessment of the composition of the individual map units was made.

Transects were made to determine the composition of soil associations, such as the Shelocta-Brownsville and Latham-Gilpin associations. Soil examinations were made at points along the transects about 50 to 100 yards apart. The transects on side slopes were made from toe slopes to ridgetops, and then a transect generally was made along the ridgetop. These transects were about a half mile apart.

After completion of the soil mapping on the 1974 aerial photographs, the delineations were transferred by hand to a set of mylars or half-tone film positives of the 1981 photo base maps. The drainageways were mapped in the field. Cultural features were recorded from observations made during the traverses.

Samples for chemical and physical analyses and for analyses of engineering properties were taken from representative sites of several of the soils in the survey area. The chemical and physical analyses were made by the Soil Characterization Laboratory, Department of Agronomy, Ohio State University, Columbus, Ohio. The results of the analyses are stored in a computerized data file at the laboratory. The analyses for engineering properties were made by the Ohio Department of Transportation, Division of Highways, Bureau of Testing, Soils and Foundation Section, Columbus, Ohio. A description of the laboratory procedures can be obtained on request from the two laboratories. The results of the studies can be obtained from the Department of Agronomy, Ohio State University; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the Soil Conservation Service, State Office, Columbus, Ohio.

General Soil Map Units

The general soil map at the back of 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 and some minor soils. It is named for the major soils. The soils 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 can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

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

Soil Descriptions

Deep and Moderately Deep Soils on Uplands

These soils make up about 82 percent of the county. They are well drained and moderately well drained, strongly sloping to very steep soils on narrow ridgetops and hillsides in the uplands. The maximum difference in local relief is about 600 feet. The soils formed in colluvium and residuum derived from sandstone, siltstone, and shale. They are used dominantly as woodland. The slope, the hazard of erosion, bedrock between depths of 20 and 40 inches, droughtiness, a high shrink-swell potential, and restricted permeability are the major management concerns.

1. Shelocta-Brownsville

Deep, steep and very steep, well drained soils formed in colluvium and residuum derived from siltstone and sandstone; on uplands

This map unit is on hillsides and very narrow ridgetops. The hillsides are generally broken by narrow benches. Rock outcrops and hillside slips are on the steeper part of some slopes. Most stream valleys are narrow. Slope ranges from 25 to 70 percent.

This map unit makes up about 51 percent of the county. It is about 40 percent Shelocta soils, 25 percent Brownsville soils, and 35 percent minor soils (fig. 2).

Permeability is moderate in the Shelocta soils and moderate or moderately rapid in the Brownsville soils. Available water capacity is moderate in the Shelocta soils and low or moderate in the Brownsville soils.

Some of the minor soils in this map unit are the Berks, Latham, and Skidmore soils. The moderately deep Berks soils are on narrow ridgetops. The moderately well drained Latham soils are on ridgetops and side slopes. Skidmore soils are on narrow flood plains. They irregularly decrease in content of organic matter with increasing depth. Also of minor extent are rock outcrops on the steeper parts of some slopes.

Most areas are wooded. Buildings and local roads are generally constructed only on the narrow ridgetops and in stream valleys. The major soils are moderately well suited to woodland. They are generally unsuited to cropland, pasture, and most urban uses.

The major problems affecting most land uses are the slope, a very severe hazard of erosion, and the very narrow ridgetops and valleys. The north- and east-facing slopes are better sites for woodland than the south- and west-facing slopes because they are characterized by less evapotranspiration and cooler temperatures.

2. Shelocta-Wharton-Latham

Deep and moderately deep, strongly sloping to steep, well drained and moderately well drained soils formed in colluvium and residuum derived from sandstone, siltstone, and shale; on uplands

This map unit is on hilly and steep uplands dissected by drainageways. Ridgetops are narrow to broad. The narrow ridgetops are hilly, and some of the broader ridgetops are undulating. The hillsides are moderately steep and steep and commonly have colluvial foot slopes. Slope ranges from 8 to 40 percent.

This map unit makes up about 18 percent of the county. It is about 45 percent Shelocta soils, 30 percent Wharton soils, 10 percent Latham soils, and 15 percent minor soils.

Shelocta soils are deep, well drained, and moderately steep and steep. They are on hillsides. Permeability and available water capacity are moderate.

Wharton soils are deep, moderately well drained, and moderately steep and steep. They are on hillsides. Permeability is moderately slow or slow. A seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods. The shrink-swell potential is moderate.

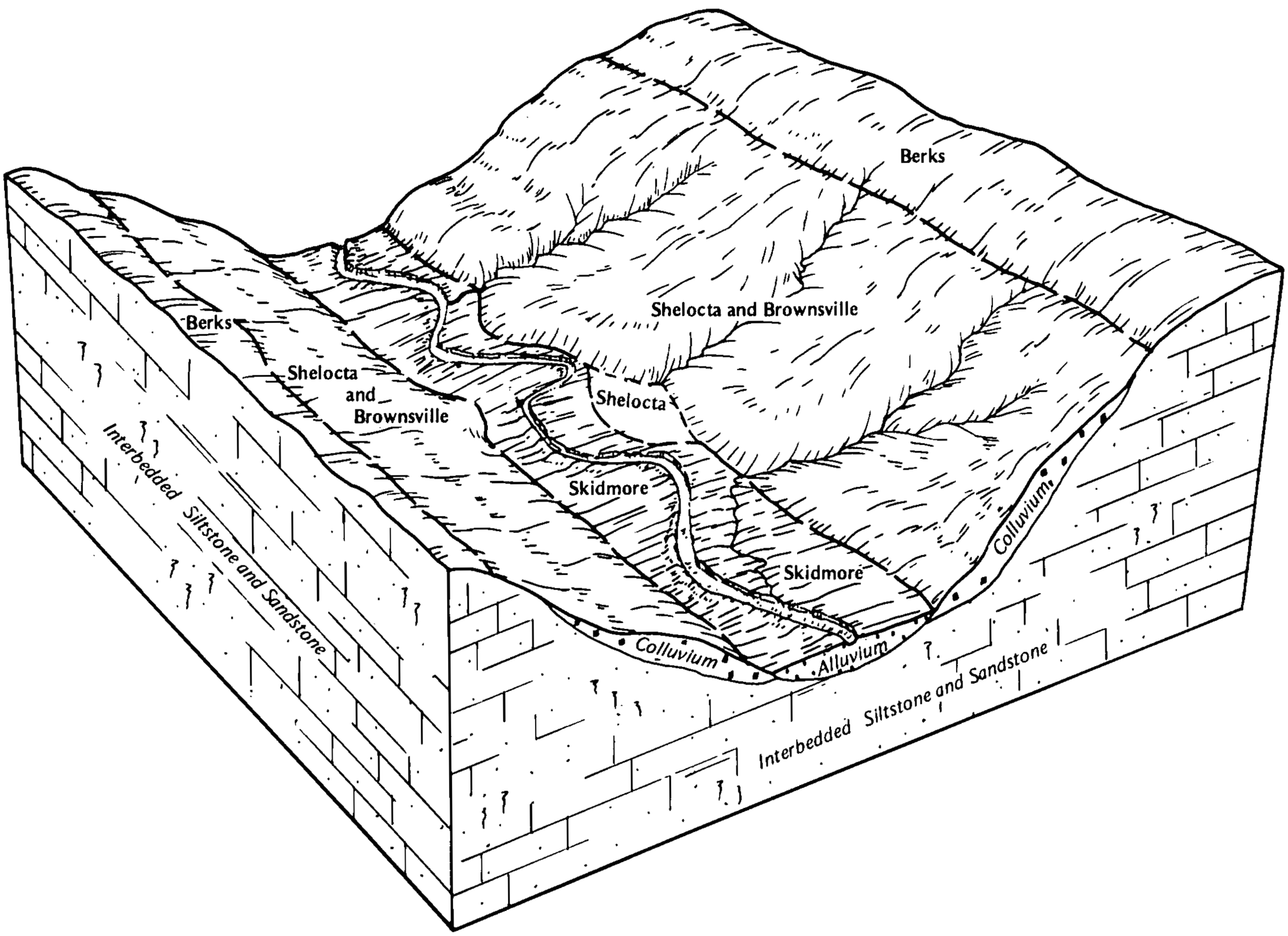


Figure 2.—Typical pattern of soils and parent material in the Shelocta-Brownsville map unit.

Latham soils are moderately deep, moderately well drained, and strongly sloping to steep. They are on ridgetops and hillsides. Permeability is slow. Available water capacity is low. The shrink-swell potential is high. A seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Some of the minor soils in this map unit are the Brownsville, Coolville, Ernest, Omulga, Skidmore, Steinsburg, and Tilsit soils. Brownsville and Skidmore soils have a higher content of coarse fragments in the subsoil than the major soils. Brownsville soils are on very steep side slopes. Skidmore soils are on narrow flood plains. Coolville and Tilsit soils are on the broader ridgetops. Coolville soils have more silt in the upper part than the major soils. Ernest, Omulga, and Tilsit soils have a fragipan. Ernest soils are on foot slopes. Omulga soils are in abandoned preglacial valleys. Steinsburg soils have more sand in the subsoil than the major soils. They are on ridgetops and the upper part of side slopes.

Most of the acreage is wooded. The wider ridgetops and strongly sloping foot slopes are commonly used as cropland or pasture. The major soils are generally unsuited or poorly suited to cropland and most urban uses. They are well suited or moderately well suited to woodland and poorly suited or moderately well suited to pasture.

The major problems affecting most land uses are the slope and a severe hazard of erosion. Other problems are the seasonal wetness, restricted permeability, and shrink-swell potential of the Wharton and Latham soils and the bedrock between depths of 20 and 40 inches in the Latham soils. The north- and east-facing slopes are better sites for woodland than the south- and west-facing slopes because they are characterized by less evapotranspiration and cooler temperatures.

3. Latham-Wharton-Shelocta

Moderately deep and deep, strongly sloping to steep, moderately well drained and well drained soils formed in colluvium and residuum derived from shale, siltstone, and sandstone; on uplands

This map unit is on ridgetops, hillsides, and foot slopes. The ridgetops are commonly wide and hilly. The side slopes have dissected benches and large slips. The valleys are narrow. Slope ranges from 8 to 40 percent.

This map unit makes up about 9 percent of the county. It is about 35 percent Latham soils, 15 percent Wharton soils, 15 percent Shelocta soils, and 35 percent minor soils (fig. 3).

Latham soils are moderately deep and moderately well drained. They are hilly on ridgetops and steep on side slopes. Permeability is slow. Available water capacity is low. The shrink-swell potential is high. A seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Wharton soils are deep, moderately well drained, and strongly sloping to steep. They are on side slopes and foot slopes. Permeability is moderately slow or slow. The shrink-swell potential and available water capacity are moderate. A seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Shelocta soils are deep, well drained, and moderately steep and steep. They are on side slopes and foot slopes. Permeability and available water capacity are moderate.

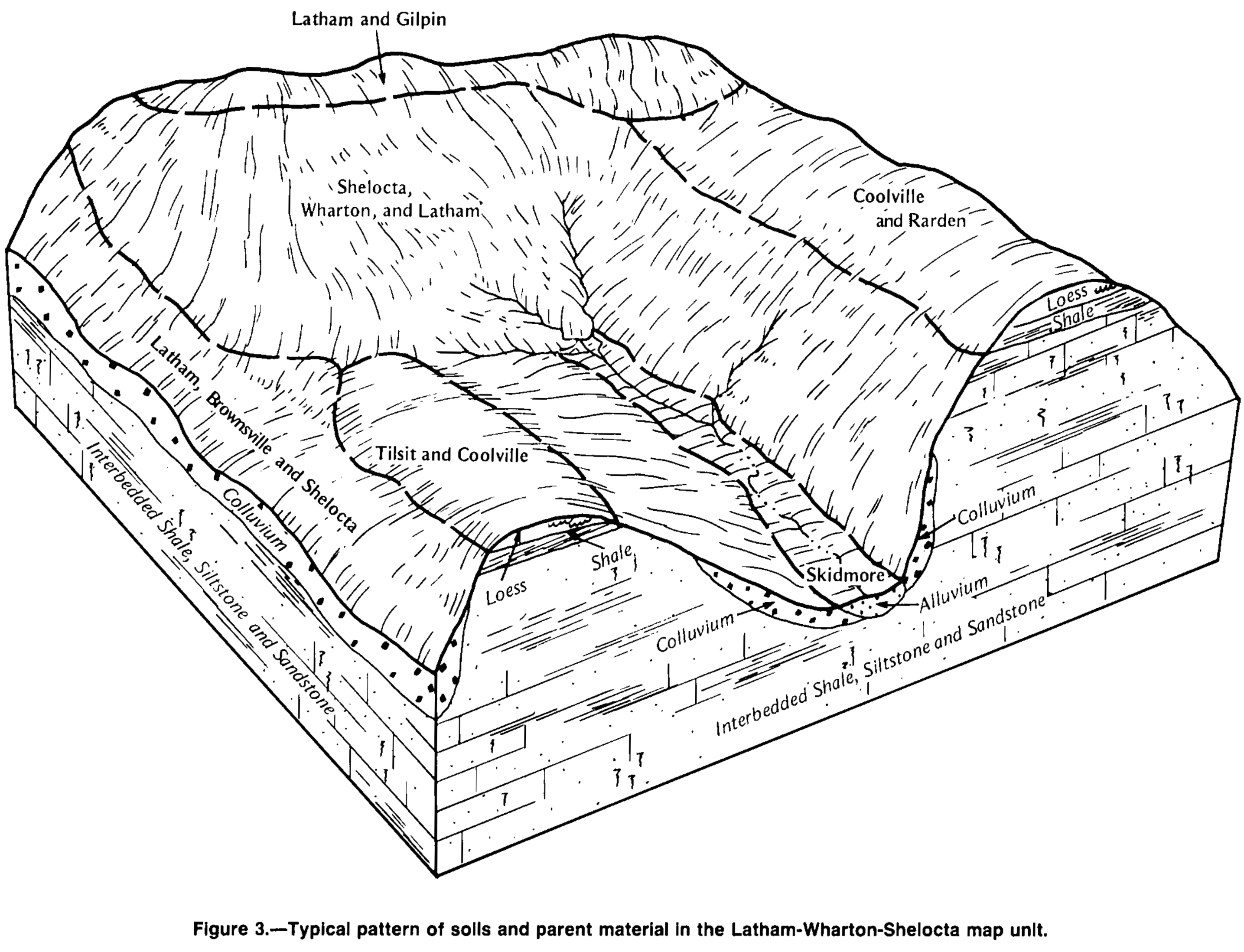


Figure 3.—Typical pattern of soils and parent material in the Latham-Wharton-Shelocta map unit.

Some of the minor soils in this map unit are the Brownsville, Coolville, Gilpin, Rarden, Skidmore, and Tilsit soils. Brownsville and Skidmore soils have a higher content of coarse fragments in the subsoil than the major soils. Brownsville soils are on side slopes. Skidmore soils are on narrow flood plains. Coolville, Rarden, and Tilsit soils are on ridgetops. Coolville soils have more silt in the upper part than the major soils, and Rarden soils have a redder subsoil. Tilsit soils have a fragipan. Gilpin soils are moderately deep over bedrock and have less clay in the subsoil than the Latham soils. They are on ridgetops and shoulder slopes.

Most of the acreage is wooded. Many of the wider ridgetops are used as cropland or pasture. Local roads are generally on ridgetops or along streams. The major soils are poorly suited or generally unsuited to cropland and most urban uses. They are well suited or moderately well suited to woodland and moderately well suited or poorly suited to pasture.

The major problems affecting most land uses are the slope and a severe hazard of erosion. Other problems are the seasonal wetness, restricted permeability, and shrink-swell potential of the Wharton and Latham soils and the bedrock between depths of 20 and 40 inches in the Latham soils. The north- and east-facing slopes are better sites for woodland than the south- and west-facing slopes because they are characterized by less evapotranspiration and cooler temperatures.

4. Shelocta-Steinsburg-Latham

Deep and moderately deep, hilly to very steep, well drained and moderately well drained soils formed in colluvium and residuum derived from siltstone, sandstone, and shale; on uplands

This map unit is on deeply dissected uplands. Ridgetops are narrow and hilly. Side slopes are very steep and have a few rock outcrops. Slope ranges from 8 to 60 percent.

This map unit makes up about 4 percent of the county. It is about 30 percent Shelocta soils, 25 percent Steinsburg soils, 10 percent Latham soils, and 35 percent minor soils (fig. 4).

Shelocta soils are deep, well drained, and very steep. They are on hillsides. Permeability and available water capacity are moderate.

Steinsburg soils are moderately deep and well drained. They are hilly on narrow ridgetops and very steep on the upper part of side slopes. Permeability is moderately rapid, and available water capacity is very low or low.

Latham soils are moderately deep, moderately well drained, and hilly. They are on the wider parts of the narrow ridgetops. Permeability is slow, and available water capacity is low. A seasonal high water table is at a depth of 1.5 to 3.0 feet. The shrink-swell potential is high.

Some of the minor soils in this map unit are the Bethesda, Brownsville, Ernest, Skidmore, and Stendal soils. Bethesda, Brownsville, and Skidmore soils have a higher content of coarse fragments throughout than the major soils. Bethesda soils are in areas that have been surface mined for coal. Brownsville soils are on hillsides. Skidmore and Stendal soils are on narrow flood plains. Stendal soils are somewhat poorly drained. Ernest soils have a fragipan. They are on foot slopes. Also of minor extent are rock outcrops on the steeper parts of some slopes.

Most of the acreage is wooded. The major soils are generally unsuited to cropland and most urban uses and are generally unsuited or poorly suited to pasture. They are moderately well suited to woodland.

The major problems affecting most land uses are the slope and a very severe hazard of erosion. Other problems are the moderate depth to bedrock and droughtiness in the Latham and Steinsburg soils and the high shrink-swell potential and restricted permeability of the Latham soils. The north- and east-facing slopes are better sites for woodland than the south- and west-facing slopes because they are characterized by less evapotranspiration and cooler temperatures.

Deep Soils in Preglacial Valleys and on Flood Plains, Terraces, and Fans

These soils make up about 13 percent of the county. They are nearly level to steep, well drained to somewhat poorly drained soils that are in preglacial and glacial valleys and on flood plains, terraces, and fans. They formed in alluvium, colluvium, loess, residuum, and lacustrine sediments. They are used as cropland, pasture, or woodland or for urban development. The hazards of flooding and erosion, the slope, restricted permeability, a moderate shrink-swell potential, and seasonal wetness are management concerns.

5. Omulga-Monongahela-Haymond

Deep, nearly level to strongly sloping, moderately well drained and well drained soils formed in alluvium, colluvium, loess, and lacustrine sediments; in preglacial valleys and on flood plains

This map unit is in valleys of abandoned preglacial drainage systems. The soils are on flood plains and on the adjacent benches and slope breaks. Slope ranges from 0 to 15 percent.

This map unit makes up about 7 percent of the county. It is about 55 percent Omulga soils, 10 percent Monongahela soils, 10 percent Haymond soils, and 25 percent minor soils.

Omulga and Monongahela soils are moderately well drained and are gently sloping and strongly sloping. They are in preglacial valleys. They have a fragipan. The root zone is mainly restricted to the part of the profile above the fragipan. Permeability is moderate above the fragipan. It is slow in the fragipan of the Omulga soils and slow or moderately slow in the fragipan of the

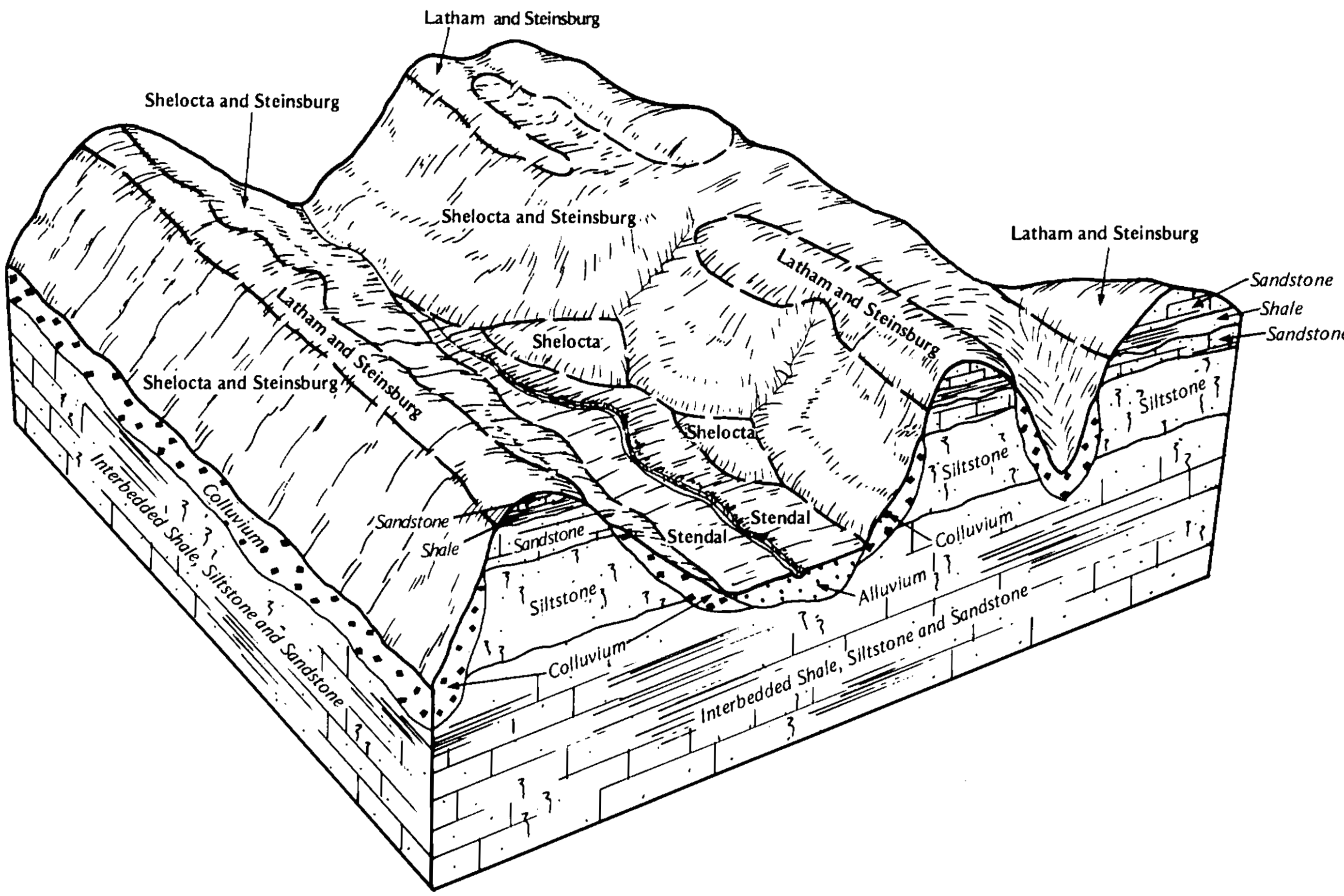


Figure 4.—Typical pattern of soils and parent material in the Shelocta-Steinsburg-Latham map unit.

Monongahela soils. The Omulga soils have a low or moderate available water capacity and a moderate shrink-swell potential. They have a seasonal high water table at a depth of 2.0 to 3.5 feet during extended wet periods. The Monongahela soils have a low available water capacity. They have a seasonal high water table at a depth of 1.5 to 3.0 feet.

Haymond soils are well drained and nearly level. They are on flood plains. They are occasionally flooded. Permeability is moderate, and available water capacity is very high.

Some of the minor soils in this map unit are the Doles, Ernest, Skidmore, Tioga, and Wyatt soils. The somewhat poorly drained Doles soils are slightly lower on the landscape than the Omulga and Monongahela soils. Ernest and Skidmore soils have a higher content of coarse fragments in the subsoil than the major soils. Ernest soils are on foot slopes. Skidmore and Tioga soils are on flood plains. Tioga soils have less silt between depths of 10 and 40 inches than the Haymond soils. Wyatt soils have more clay in the subsoil than the major soils. They are on benches and side slopes.

Most of the acreage is used as cropland or pasture. Some areas are used for urban development. The major soils are moderately well suited or well suited to cropland and pasture and are well suited to woodland. The suitability for most urban uses ranges from generally unsuited to moderately well suited. The Omulga and Monongahela soils are better suited to urban uses than the Haymond soils.

The major problems affecting most land uses are the hazard of erosion, seasonal wetness, potential for frost action, restricted permeability, moderate shrink-swell potential, and low strength in the Omulga and Monongahela soils and the flooding on the Haymond soils.

6. Weinbach-Wheeling-Elkinsville

Deep, nearly level to steep, somewhat poorly drained and well drained soils formed in alluvium; on terraces

This map unit is on nearly level and undulating benches and on slope breaks in the major stream valleys. Some areas that are included with the major soils in mapping are subject to rare flooding. Slope ranges from 0 to 40 percent.

This map unit makes up about 4 percent of the county. It is about 15 percent Weinbach soils, 15 percent Wheeling soils, 15 percent Elkinsville soils, and about 55 percent minor soils.

Weinbach soils are nearly level and somewhat poorly drained. They are on flats. They have a fragipan in the lower part. Permeability is moderate above the fragipan and very slow in the fragipan. The root zone is restricted mainly to the part of the profile above the fragipan. This zone has a low or moderate available water capacity. A seasonal high water table is at a depth of 1 to 3 feet during extended wet periods.

Wheeling and Elkinsville soils are well drained. They are on slight rises and slope breaks. Wheeling soils are gently sloping. They are moderately permeable in the subsoil and rapidly permeable in the substratum. They have a moderate available water capacity. Elkinsville soils are gently sloping to steep. They are moderately permeable. They have a high available water capacity.

Some of the minor soils in this map unit are the Fitchville, Nolin, Peoga, Sardinia, and Skidmore soils. Fitchville soils are in landscape positions similar to those of the Weinbach soils. They do not have a fragipan. Nolin and Skidmore soils are on flood plains. They irregularly decrease in content of organic matter with increasing depth. The poorly drained Peoga soils are on flats and in depressions on terraces. The moderately well drained Sardinia soils are in areas between the Weinbach and Elkinsville soils.

Most areas are used as cropland. Some are pastured. Buildings and local roads are generally constructed on the higher parts of the terraces. The nearly level and gently sloping areas of the major soils are well suited to cropland, pasture, and woodland. They are well suited or poorly suited to most urban uses. The steep Elkinsville soils are generally unsuited to cropland and urban uses. They are well suited to woodland. The included areas that are subject to rare flooding are generally unsuitable for urban uses.

The major problems affecting most land uses are the seasonal wetness and very slow permeability of the Weinbach soils and the hazard of erosion and slope in areas of the steep Elkinsville soils. Rare flooding is a hazard in some included areas. Because of the rapid permeability in the substratum, the Wheeling soils do not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

7. Nolin-Shelocta-Omulga

Deep, nearly level to strongly sloping, well drained and moderately well drained soils formed in alluvium, colluvium, residuum, loess, and lacustrine sediments; on flood plains, on fans, and in preglacial valleys

This map unit is in valleys of abandoned preglacial drainage systems. The landscape is characterized by narrow to relatively broad, nearly level valley floors and intermittent benches and fans that are typically adjacent to the uplands. Slope ranges from 0 to 15 percent.

This map unit makes up about 1 percent of the county. It is about 40 percent Nolin soils, 25 percent Shelocta soils, 15 percent Omulga soils, and 20 percent minor soils.

Nolin soils are well drained and nearly level. They are on broad flood plains. They are occasionally flooded. Permeability is moderate, and available water capacity is very high.

Shelocta soils are well drained and gently sloping. They are on fans along valley walls. Permeability is moderate, and available water capacity is moderate or high.

Omulga soils are moderately well drained and are gently sloping and strongly sloping. They are in undulating areas and on slope breaks. They have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. The root zone is mainly restricted to the part of the profile above the fragipan. This zone has a low or moderate available water capacity. A seasonal high water table is at a depth of 2.0 to 3.5 feet during extended wet periods.

Some of the minor soils in this map unit are the Elkinsville, Piopolis, Sardinia, Skidmore, and Wyatt soils. Elkinsville and Sardinia soils do not have a fragipan. They are on terraces. Piopolis and Skidmore soils are on flood plains. Piopolis soils are poorly drained and very poorly drained. Skidmore soils have a higher content of coarse fragments in the subsoil than the major soils. Wyatt soils are intermingled with areas of the Omulga soils on the undulating parts of the landscape and on slope breaks. They have more clay in the subsoil than the Omulga soils.

Most areas are used as cropland or pasture. The major soils are well suited or moderately well suited to cropland and pasture and are well suited to woodland. The Nolin soils are generally unsuited to most urban uses, the Shelocta soils are well suited, and the Omulga soils are poorly suited or moderately well suited.

The major problems affecting most land uses are the flooding on the Nolin soils and the hazard of erosion, potential for frost action, restricted permeability, seasonal wetness, and moderate shrink-swell potential in areas of the Omulga soils.

8. Tioga-Sardinia-Fitchville

Deep, nearly level and gently sloping, well drained to somewhat poorly drained soils formed in alluvium; on flood plains and terraces

The map unit is on relatively broad, nearly level flood plains and on low terraces in valleys that have meandering streams. Slope ranges from 0 to 8 percent.

The map unit makes up about 1 percent of the county. It is about 30 percent Tioga soils, 30 percent Sardinia soils, 20 percent Fitchville soils, and 20 percent minor soils.

Tioga soils are well drained and nearly level. They are on flood plains adjacent to the major streams. They are occasionally flooded. Permeability is moderate or moderately rapid in the subsoil and rapid in the substratum. Available water capacity is moderate. A seasonal high water table is at a depth of 3 to 6 feet.

Sardinia soils are moderately well drained and gently sloping. They are on slight rises on broad, low terraces. Permeability is moderate or moderately slow. Available water capacity is high or very high. A seasonal high water table is at a depth of 1.5 to 3.0 feet.

Fitchville soils are somewhat poorly drained and nearly level. They are on broad flats and along drainageways on low terraces. Permeability is moderately slow. Available water capacity is high. A seasonal high water table is at a depth of 1.0 to 2.5 feet.

Some of the minor soils in this map unit are the Cuba, Piopolis, Stendal, Wheeling, and Wyatt soils. Cuba, Piopolis, and Stendal soils are on flood plains. Cuba and Stendal soils have more silt in the subsoil than the Tioga soils. Piopolis soils are poorly drained and very poorly drained. Wheeling soils show more evidence of subsoil development than the Tioga soils. They are on terraces. Wyatt soils are on benches and slope breaks along valley walls. They have more clay in the subsoil than the major soils.

Most areas are used as cropland or pasture. The major soils are well suited to cropland, pasture, and woodland. The suitability for most urban uses ranges from generally unsuited to moderately well suited. The Sardinia soils are better suited to urban uses than the Tioga and Fitchville soils.

The major problems affecting most land uses are the flooding on the Tioga soils and the seasonal wetness, moderate shrink-swell potential, and moderately slow permeability in the Sardinia and Fitchville soils. The erosion hazard on the Sardinia soils also is a management concern.

Deep Soils on Flood Plains

These soils make up about 5 percent of the county. They are well drained and somewhat poorly drained soils that formed in alluvium on flood plains. They are occasionally flooded. The maximum difference in local relief is about 50 feet. The soils are used as cropland, pasture, or woodland. The hazard of flooding and seasonal wetness are the major management concerns.

9. Nolin-Genesee

Deep, nearly level, well drained soils formed in alluvium; on flood plains

This map unit is on broad flood plains. The soils are occasionally flooded. Slope ranges from 0 to 3 percent.

This map unit makes up about 4 percent of the county. It is about 60 percent Nolin soils, 15 percent Genesee soils, and 25 percent minor soils.

Nolin and Genesee soils are moderately permeable. Nolin soils have a very high available water capacity, and Genesee soils have a high or very high available water capacity.

Some of the minor soils in this map unit are the Elkinsville, Fitchville, Ockley, Sciotoville, and Weinbach soils on terraces. These soils show more evidence of subsoil development than the major soils. Also, Sciotoville and Weinbach soils have a fragipan.

Most areas are used as cropland. Local roads and buildings are commonly constructed on the adjacent terraces. The major soils are well suited to row crops, pasture, and woodland. They are generally unsuited to urban uses.

The major problem affecting most land uses is the flooding. Also, surface crusting is a problem if the soils are used for row crops.

10. Stendal-Cuba-Tioga

Deep, nearly level, somewhat poorly drained and well drained soils formed in alluvium; on flood plains

This map unit is in relatively wide valleys bounded by steep or very steep areas on the adjacent uplands. The soils are occasionally flooded. Slope ranges from 0 to 3 percent.

This map unit makes up about 1 percent of the county. It is about 30 percent Stendal soils, 30 percent Cuba soils, 15 percent Tioga soils, and 25 percent minor soils.

Stendal soils are on the lowest parts of the flood plains, and Tioga and Cuba soils are on the higher parts. Stendal soils are somewhat poorly drained and moderately permeable. They have a high available water capacity and have a seasonal high water table at a depth of 1 to 3 feet. Cuba and Tioga soils are well drained. Cuba soils are moderately permeable. They have a high or very high available water capacity. Tioga soils are moderately permeable or moderately rapidly permeable in the subsoil and rapidly permeable in the substratum. They have a moderate available water capacity and have a seasonal high water table at a depth of 3 to 6 feet.

Some of the minor soils in this map unit are the Piopolis and Shelocta soils. The poorly drained and very poorly drained Piopolis soils are in depressions. Shelocta soils have a higher content of angular coarse fragments in the subsoil than the major soils. They are on fans along valley walls.

This map unit is used as cropland, pasture, or woodland. The cropland occurs mainly as areas of the well drained Cuba and Tioga soils and as areas of the

Stendal soils that are adequately drained. The crops grown, such as corn and soybeans, are those that can be planted after the normal period of flooding in spring. Winter wheat may be severely damaged by flooding and seasonal wetness in winter and spring. The major soils are well suited to cropland, pasture, and woodland. They are generally unsuited to most urban uses.

The major problems affecting most land uses are the hazard of flooding on all the major soils and the seasonal wetness of the Stendal soils. Also, surface crusting is a problem if the soils are used for row crops.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

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

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, 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 substratum. 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, Omulga silt loam, 1 to 8 percent slopes, is a phase of the Omulga series.

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

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Wheeling-Urban land complex, 1 to 8 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. The Shelocta-Brownsville association, steep, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarry, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AfD—Alford silt loam, 10 to 25 percent slopes. This deep, well drained, moderately steep soil is on shoulder slopes and ridgetops in the uplands. Areas are broad and circular and range from 5 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsurface layer is dark yellowish brown, friable silt loam about 5 inches thick. The subsoil to a depth of about 70 inches is yellowish brown and strong brown, friable silt loam. It is mottled below a depth of about 37 inches. In some areas it has more sand. In other areas the soil is moderately well drained. In some places it has a fragipan. In other places it is redder. In some areas reaction is neutral in the subsoil.

Included with this soil in mapping are small areas of Omulga and Shelocta soils. Omulga soils are in the less sloping areas. They have a fragipan. Shelocta soils are on side slopes. They have a higher content of coarse fragments in the subsoil than the Alford soil. Included soils make up about 15 percent of the unit.

Permeability is moderate in the Alford soil. Available water capacity is high or very high. Runoff is rapid or very rapid. The potential for frost action is high. The subsoil is strongly acid to slightly acid.

This soil is poorly suited to corn, soybeans, and small grain. It can be cropped, but the cropping system should include a high proportion of long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, planting cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Locating logging roads and skid trails on the contour facilitates the use of equipment and reduces the hazard of erosion. Water bars also reduce the hazard of erosion.

In areas where the slope is 10 to 15 percent, this soil is moderately well suited to buildings and septic tank absorption fields. In areas where the slope is more than 15 percent, however, it is poorly suited to these uses. Buildings should be designed so that they conform to the natural slope of the land. Land shaping is needed in most areas. If the more nearly level areas are excavated, a retaining wall is needed to prevent downslope movement of the soil. Maintaining as much vegetation as possible on the site during construction reduces the hazard of erosion. Installing the distribution lines in septic tank absorption fields on the contour minimizes the seepage of effluent to the surface. Local roads should be built across the slope. Providing suitable base material minimizes the damage caused by frost action and low strength.

The land capability classification is IVe. The woodland ordination symbol is 5R.

BeC—Berks channery silt loam, 8 to 15 percent slopes. This moderately deep, well drained, strongly sloping soil is on convex ridgetops. Most areas are long and are 25 to 100 feet wide. They range from 6 to 30 acres in size.

Typically, about 1 inch of partly decomposed leaf litter is at the surface. The surface layer is dark gray, friable silt loam about 2 inches thick. The subsoil is about 20 inches thick. The upper part is light yellowish brown, friable channery silt loam, and the lower part is yellowish brown, friable extremely flaggy and very channery silt loam. The substratum is yellowish brown, friable extremely flaggy silt loam. Fine grained sandstone bedrock is at a depth of about 28 inches. In some areas the slope is slightly less than 8 percent, and in others it is more than 15 percent. In places the subsoil has fewer coarse fragments.

Included with this soil in mapping are small areas of Brownsville and Gilpin soils. Brownsville soils are deep over bedrock. They are on side slopes. Gilpin soils have fewer coarse fragments in the subsoil than the Berks soil. They are on the wider parts of the ridgetops. Also included are small areas of shallow soils that are almost completely covered with rock fragments. Included soils make up about 15 percent of the unit.

Permeability is moderate or moderately rapid in the Berks soil. Available water capacity is very low. Runoff is medium or rapid. The root zone is mainly restricted to the 20- to 40-inch zone above the fractured sandstone or fine grained siltstone bedrock. In some areas, however, roots grow along the fracture planes (fig. 5). The subsoil is very strongly acid to medium acid.

This soil is generally unsuitable as cropland and pasture because it occurs as narrow areas and has a very low available water capacity. Also, most areas are inaccessible to farm machinery because the surrounding soils are very steep.

This soil is moderately well suited to trees. In some areas access to this soil is limited because of the very steep slope of the adjoining soils. Mulching around seedlings reduces the seedling mortality rate. Seedling losses can be offset by increasing the planting rate.

This soil is moderately well suited to buildings and poorly suited to septic tank absorption fields. It is generally not used for these purposes because of the limited accessibility. The slope and the bedrock between depths of 20 and 40 inches are limitations. Buildings should be designed so that they conform to the natural slope of the land. Installing septic tank absorption fields in suitable fill material elevates the field above the bedrock and improves the ability of the field to filter the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4F.

BhD—Bethesda very shaly clay loam, 8 to 25 percent slopes. This deep, well drained, strongly sloping and moderately steep soil is on mine spoil ridges in areas that have been surface mined for coal. Slopes are uneven. The soil is a mixture of rock fragments and partly weathered fine-earth material that was in or below the profile of the original soil. Most of the rock fragments are flat and are less than 10 inches long. Most areas are long, narrow, and winding or are broad and circular and are 150 to 1,000 feet wide. They range from 10 to more than 250 acres in size.

Typically, the surface layer is variegated light olive brown, light gray, and yellowish brown, friable very shaly clay loam about 6 inches thick. The substratum to a depth of about 60 inches is multicolored, friable

Figure 5.—Roots growing along fracture planes in the bedrock underlying Berks channery silt loam, 8 to 15 percent slopes.

channery sandy loam, extremely shaly clay loam, very channery sandy loam, and very channery clay loam. In some areas the soil is less acid. In a few areas it has more sand.

Included with this soil in mapping are small areas of Latham, Steinsburg, and Wharton soils. These soils have not been disturbed by mining activities. They have a subsoil. They make up about 15 percent of the unit.

Permeability is moderately slow in the Bethesda soil. Available water capacity is low. Runoff is rapid or very rapid. The depth of the root zone varies within short distances because of differences in the density of the soil material. The substratum is extremely acid to medium acid.

This soil generally is unsuited to row crops and hay because it is a poor growing medium for roots. It is droughty and low in fertility. The surface layer is very shaly, has weak structure, and puddles and crusts easily. The hazard of erosion is very severe if cultivated crops are grown. A permanent plant cover is the best means of controlling erosion.

Some areas are pastured. This soil is poorly suited to pasture. If the pasture is overgrazed or is plowed during seedbed preparation, the hazard of erosion is very severe. Proper stocking rates and pasture rotation help to prevent overgrazing and excessive soil loss. No-till seeding also helps to prevent excessive soil loss. Restricted grazing during wet periods helps to prevent surface compaction. Soil tests are needed to determine specific nutrient needs. Ground cover and surface mulch reduce the runoff rate and the susceptibility to erosion and increase the rate of water intake.

Most areas support brush and trees. This soil is best suited to the trees that can withstand the acidity, the droughtiness, and the restricted root zone. Erosion can be controlled by building logging roads on the contour and by establishing water bars. The use of equipment is sometimes restricted because the soil is soft and slippery when wet.

Once the soil has settled, areas where the slope is 8 to 15 percent are moderately well suited to buildings and poorly suited to septic tank absorption fields. Onsite investigation is needed to determine suitability. The depth of the soil over bedrock, the susceptibility to hillside slippage, and control of storm water runoff are important management considerations. Areas where the soil has not had sufficient time to settle or where the slope is 15 to 25 percent are generally unsuitable as sites for buildings and septic tank absorption fields because of the slope and the hazard of slippage. Building local roads on the contour and seeding road cuts help to control erosion.

The slope and the moderately slow permeability are limitations on sites for septic tank absorption fields. Installing the distribution lines on the contour minimizes the lateral seepage of effluent to the surface. Increasing the size of the absorption field helps to overcome the restricted permeability. An aeration system is used in some areas.

The land capability classification is VIs. No woodland ordination symbol is assigned.

BrF—Brownsville-Rock outcrop association, very steep. This association consists of a well drained Brownsville soil and areas of Rock outcrop. It is on side slopes along streams. The Brownsville soil is dominantly on the middle and lower parts of the side slopes, and the Rock outcrop occurs as bedrock escarpments on the upper part of the side slopes (fig. 6). Because of present and anticipated land uses, separating the Brownsville soil and the Rock outcrop in mapping was not considered practical or necessary.

Typically, the Brownsville soil has a surface layer of yellowish brown, friable channery silt loam about 3 inches thick. The subsoil is light yellowish brown, friable and firm very channery and extremely channery silt loam about 40 inches thick. The substratum to a depth of about 60 inches is light yellowish brown, firm extremely channery silt loam.

The Rock outcrop is on vertical cliffs and ledges.

Included in this association in mapping are areas of Berks, Ernest, and Shelocta soils. The moderately deep Berks soils are intermingled with areas of the Rock outcrop on the upper part of the slopes. Ernest soils have a fragipan. They are on colluvial foot slopes. Shelocta soils have fewer coarse fragments in the subsoil than the Brownsville soil. They are in landscape positions similar to those of the Brownsville soil. Included soils make up about 20 percent of the association.

Permeability is moderate or moderately rapid in the Brownsville soil. Available water capacity is low or moderate. Runoff is rapid or very rapid. The subsoil is strongly acid to extremely acid.

Most areas support native hardwoods. Because of the very steep slope, a severe hazard of erosion, and the Rock outcrop, this association is generally unsuited to cultivated crops and to hay and pasture.

The Brownsville soil is moderately well suited to woodland. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating skid trails and logging roads on or nearly on the contour and establishing water bars help to control erosion. Seeding log landings, skid trails, and logging roads after the trees are harvested also helps to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. The very steep slope and the bedrock escarpments severely limit the use of planting and harvesting equipment. Cable logging equipment can be used. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking.

Because of the slope and the Rock outcrop, this association is generally unsuitable as a site for dwellings and sanitary facilities. Developing sites for recreational and urban uses is very difficult. Cutting and filling increase the hazard of hillside slippage. Some areas are scenic and have potential as sites for hiking trails and lookout points. The hazard of erosion is very severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible.

The land capability classification is VIIe. The woodland ordination symbol is 4R in areas of the Brownsville soil on north aspects, 3R on south aspects. The Rock outcrop is not assigned a woodland ordination symbol.

CaF—Casco loam, 40 to 70 percent slopes. This deep, well drained, very steep soil is on slope breaks on terraces. Most areas are long and rather narrow and range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable loam about 4 inches thick. The subsoil is about 16 inches thick. The upper part is dark yellowish brown, friable clay loam, and the lower part is brown, friable gravelly clay loam. The

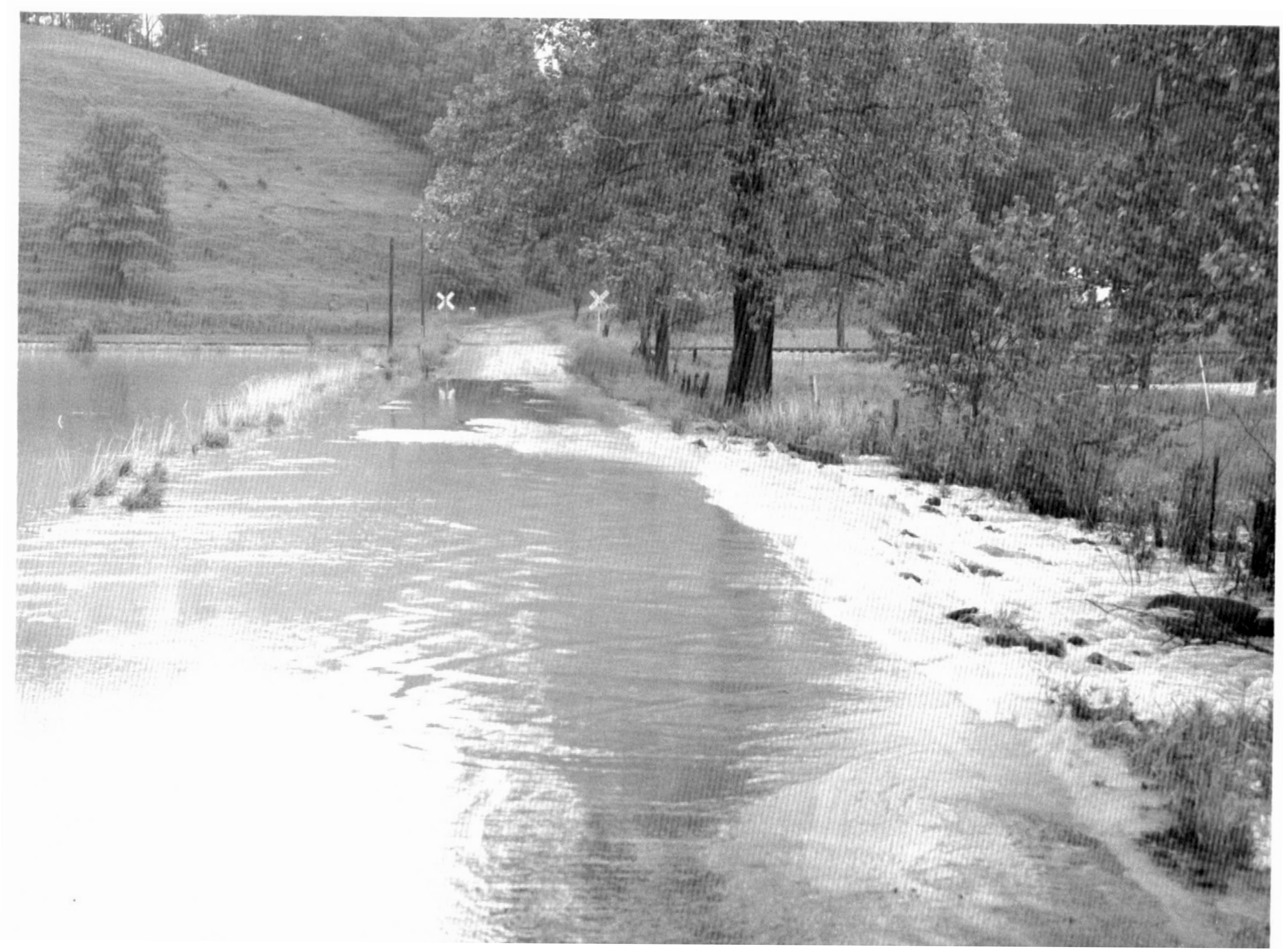


Figure 6.—Rock outcrop in an area of the Brownsville-Rock outcrop association, very steep.

substratum to a depth of about 60 inches is brown, loose very gravelly sand and gravelly sand. In some areas the surface layer is gravelly sandy loam, silt loam, or gravelly loam. In other areas the soil is not so steep. In a few places the subsoil is thicker.

Included with this soil in mapping are small areas of Elkinsville and Shelocta soils. Elkinsville soils have less sand and gravel throughout than the Casco soil. They are in landscape positions similar to those of the Casco soil. Shelocta soils do not have sand and gravel in the substratum. They are on slope breaks to the uplands. Included soils make up about 15 percent of the unit.

Permeability is moderate in the subsoil of the Casco soil and very rapid in the substratum. Available water capacity is low. Runoff is very rapid. The subsoil is slightly acid to mildly alkaline.

Most areas support native hardwoods. Some are pastured. Because of the very steep slope, droughtiness, and a severe hazard of erosion, this soil is generally unsuitable as cropland and pasture. It is moderately well suited to trees. Erosion can be controlled by seeding log landings, skid trails, and logging roads after the trees are harvested. Water bars also help to control erosion on skid trails and logging roads. The slope limits the use of equipment. Logging equipment can be operated in the less sloping areas above or below this soil. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard.

Because of the slope and the very rapid permeability in the substratum, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields.

Developing sites for recreational and urban uses is very difficult. The hazard of erosion is severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible.

The land capability classification is VIIe. The woodland ordination symbol is 4R.

CoB—Coolville silt loam, 1 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on ridgetops and in broad upland areas. Most areas are circular or are long and narrow. They range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 37 inches thick. The upper part is strong brown, mottled, friable silty clay loam; the next part is brown, yellowish red, and strong brown, mottled, firm silty clay; and the lower part is yellowish brown, firm shaly silty clay loam. Soft shale bedrock is at a depth of about 45 inches. In some areas the subsoil contains less clay. In a few areas the soil has clayey textures closer to the surface.

Included with this soil in mapping are small areas of the moderately deep Gilpin and Rarden soils. Gilpin soils are on the highest part of the landscape. Rarden soils are in dissected areas. Included soils make up about 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Coolville soil and slow or very slow in the lower part. Available water capacity is moderate. Runoff is medium. The shrink-swell potential is moderate. The subsoil is strongly acid to extremely acid. A perched seasonal high water table is at a depth of 2.0 to 3.5 feet during extended wet periods.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If cultivated crops are grown, erosion is a hazard. These crops can be grown year after year if erosion is controlled and improved management is applied. Maintaining tilth and the organic matter content is a management concern. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour tillage or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the susceptibility to erosion. Tilling within the optimum moisture range minimizes surface compaction.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because the seasonal wetness and the slow or very slow permeability are severe limitations, this soil is poorly suited to septic tank absorption fields. Increasing the size of the absorption area or using an aeration system helps to overcome these limitations. Installing perimeter drains around the absorption field lowers the seasonal high water table.

This soil is moderately well suited to dwellings and local roads. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Grading building sites can help to keep surface water away from foundations. Backfilling excavations around walls and foundations with material that has a low shrink-swell potential minimizes the structural damage caused by shrinking and swelling. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The land capability classification is IIe. The woodland ordination symbol is 4A.

CpC—Coolville-Rarden silt loams, 8 to 15 percent slopes. These moderately well drained soils are on ridgetops. The deep Coolville soil is commonly in the middle of the ridgetops, and the moderately deep Rarden soil is on the edges of the ridgetops and on shoulder slopes. Areas are circular or are long and are commonly 200 to 400 feet wide. They range from 15 to 100 acres in size. Most are about 65 percent Coolville silt loam and 25 percent Rarden silt loam. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Coolville soil has a surface layer of brown, friable silt loam about 8 inches thick. The subsoil is about 29 inches thick. It is yellowish brown and strong brown. The upper part is firm silty clay loam and silty clay, and the lower part is mottled, firm shaly silty clay loam. The substratum is yellowish brown, firm channery silty clay loam. Soft shale bedrock is at a depth of about 43 inches. In some areas the subsoil has less clay. In a few areas the soil has clayey textures closer to the surface.

Typically, the Rarden soil has a surface layer of brown, friable silt loam about 8 inches thick. The subsoil is about 24 inches thick. It is yellowish red, mottled, and firm. The upper part is silty clay, and the lower part is channery silty clay. Yellowish brown siltstone and shale bedrock is at a depth of about 32 inches. In some areas the subsoil is not so red. In other areas it has more silt in the upper part.

Included with these soils in mapping are small areas of Gilpin soils on the highest part of the landscape. These included soils have less clay in the subsoil than the

Coolville and Rarden soils. They make up about 10 percent of the unit.

Permeability is moderate in the upper part of the subsoil in the Coolville soil and slow or very slow in the lower part. It is slow in the Rarden soil. The Coolville soil has a moderate available water capacity and a moderate shrink-swell potential. The Rarden soil has low available water capacity and a high shrink-swell potential. Runoff is rapid on both soils. These soils can be easily tilled. The subsoil of the Coolville soil is extremely acid to strongly acid, and that of the Rarden soil is very strongly acid or strongly acid. A perched seasonal high water table is in the lower part of the subsoil of both soils during extended wet periods.

These soils are moderately well suited to corn, soybeans, and small grain. They can be cropped successfully, but the cropping system should include a high proportion of long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, planting cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. These soils are moderately well suited to hay and pasture. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Most areas support native hardwoods. These soils are moderately well suited to trees. Seedling mortality and the windthrow hazard are problems in areas of the Rarden soil. The seedling mortality rate can be reduced by planting seedlings that have been transplanted once. Seedling losses can be offset by overstocking. The windthrow hazard can be reduced by harvesting procedures that do not isolate the remaining trees or leave them widely spaced.

These soils are poorly suited to dwellings and septic tank absorption fields. Because of the seasonal wetness, they are better suited to houses without basements than to houses with basements. Properly designing foundations and footings and backfilling excavations around walls and foundations with material that has a low shrink-swell potential minimize the structural damage caused by shrinking and swelling. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. The buildings should be designed so that they conform to the natural slope of the land. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by low strength and frost action.

The moderate depth to bedrock in the Rarden soil and the very slow or slow permeability and seasonal wetness in both soils are severe limitations on sites for septic tank absorption fields. Installing the absorption field in suitable fill material or using an aeration system helps to overcome these limitations. Installing interceptor drains upslope from the absorption field reduces the seasonal wetness. Installing the distribution lines on the contour minimizes the seepage of effluent to the surface.

The land capability classification is IIIe. The woodland ordination symbol assigned to the Coolville soil is 4A, and that assigned to the Rarden soil is 4C.

Cu—Cuba silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains (fig. 7). Most areas are long and narrow or are circular. They range from 5 to 50 acres in size. Slope is 0 to 2 percent.

Typically, the surface layer is brown, friable silt loam about 11 inches thick. The subsoil is yellowish brown, friable silt loam about 26 inches thick. It is mottled below a depth of about 23 inches. The substratum to a depth of about 60 inches is dark yellowish brown, mottled, friable silt loam. In some areas the soil is moderately well drained. In a few areas the subsoil has less clay.

Included with this soil in mapping are small areas of Skidmore and Tioga soils. These soils are in landscape positions similar to those of the Cuba soil. Skidmore soils have a higher content of coarse fragments in the subsoil than the Cuba soil, and Tioga soils have more sand in the subsoil. Included soils make up about 5 percent of the unit.

Permeability is moderate in the Cuba soil, and available water capacity is high or very high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is very strongly acid or strongly acid.

Most areas are farmed. This soil is well suited to corn and soybeans. Small grain, such as winter wheat, is damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in spring. Returning crop residue to the soil and regularly adding other organic material improve fertility, minimize crusting, and increase the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

Figure 7.—An inundated area of Cuba silt loam, occasionally flooded.

The land capability classification is IIw. The woodland ordination symbol is 5A.

DoA—Doles silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained, nearly level soil is in preglacial valleys. Most areas are circular or are long and narrow. They range from 5 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 4 inches thick. The subsurface layer is yellowish brown, mottled, friable silt loam about 4 inches thick. The subsoil to a depth of about 62 inches is yellowish brown, mottled silt loam. The upper part is friable, the next part is a firm and very firm fragipan, and the lower part is firm. In some areas the soil does not have a fragipan. In a few places it is poorly drained.

Included with this soil in mapping are small areas of the moderately well drained Monongahela, Omulga, and Wyatt soils. These soils are in the more sloping areas. Also included are small areas of the well drained Haymond and Tioga soils on flood plains. Included soils make up about 10 percent of the unit.

Permeability is slow in the Doles soil. The root zone is restricted mainly to the 20 to 30 inches above the fragipan. This zone has a low available water capacity. Runoff is slow. The subsoil is very strongly acid to medium acid. A perched seasonal high water table is at a depth of 1 to 2 feet.

Some areas are used as cropland. This soil is well suited to corn, soybeans, and small grain. A drainage system is needed. Surface or subsurface drains can remove excess water where adequate outlets are available. Subsurface drains are more effective if they are installed on or above the slowly permeable fragipan. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction and improves tilth.

Drained areas of this soil are well suited to grasses and legumes for hay and pasture. Undrained areas, however, are only moderately well suited and are poorly suited to grazing early in spring. Surface and subsurface drains can remove excess water where adequate outlets are available. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted grazing during wet periods help to keep the pasture in good condition. When new stands are established, the species that can withstand some wetness should be selected for planting.

Most areas are used as woodland. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to dwellings and septic tank absorption fields. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Drainage can be improved by subsurface drains and open ditches. Properly landscaping building sites helps to keep surface water away from foundations. Increasing the size of septic tank absorption fields improves the ability of the soil to absorb effluent. Perimeter drains around the absorption field reduce the wetness. Aeration systems can be used. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by low strength and frost action.

The land capability classification is IIw. The woodland ordination symbol is 4A.

Dp—Dumps. This map unit occurs mainly as areas of cement, bricks, cinders, slag, and other debris of industrial origin. Some areas are sanitary landfills containing mainly home refuse. Most areas are 5 to 40 acres in size.

The physical characteristics affecting plant growth commonly are poor. Reaction varies. The existing fine earth is susceptible to erosion unless it can support a protective plant cover.

No land capability classification or woodland ordination symbol is assigned.

EkB—Elkinsville silt loam, 1 to 8 percent slopes. This deep, well drained, gently sloping soil is on terraces along streams. Most areas are long and rather narrow or are circular. They range from 3 to 90 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 50 inches of yellowish brown, strong brown, and dark brown, firm silty clay loam and friable silt loam. It is mottled in the lower part. The substratum to a depth of about 70 inches is dark brown, mottled, friable loam. In some areas the soil is moderately well drained. In a few areas the subsoil has more sand.

Included with this soil in mapping are small areas of the poorly drained Peoga and somewhat poorly drained Weinbach soils along drainageways and in depressions. Also included are areas that are subject to rare flooding. Included soils make up about 5 percent of the unit.

Permeability is moderate in the Elkinsville soil, and available water capacity is high. The surface layer can be easily tilled throughout a fairly wide range in moisture content. Runoff is slow or medium. The subsoil is very strongly acid to medium acid. The potential for frost action is high.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is well suited to dwellings and septic tank absorption fields. A moderate shrink-swell potential is a limitation on sites for dwellings. Properly designing foundations and footings and backfilling along the foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Providing suitable base material under local roads and streets minimizes the road damage caused by low strength and frost action. The included areas that are subject to flooding are generally unsuitable for building site development.

The land capability classification is IIe. The woodland ordination symbol is 5A.

EkE—Elkinsville silt loam, 25 to 40 percent slopes. This deep, well drained, steep soil is on slope breaks between terrace levels or between terraces and flood plains. Most areas are long and narrow and range from 5 to 25 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 45 inches of brown and yellowish brown, friable and firm silt loam and silty clay loam. The substratum to a depth of about 64 inches is yellowish brown, friable silt loam. In some areas the soil is moderately well drained. In a few areas the subsoil has more sand.

Included with this soil in mapping are narrow strips of Casco soils. These soils are in the steeper areas or in landscape positions similar to those of the Elkinsville soil. They have a higher content of sand and coarse fragments in the subsoil and substratum than the Elkinsville soil. Also included are areas that are subject to rare flooding. Included soils make up about 10 percent of the unit.

Permeability is moderate in the Elkinsville soil, and available water capacity is high. Runoff is very rapid. The subsoil is very strongly acid to medium acid. The potential for frost action is high.

Some areas are used for pasture. Because of the steep slope and a very severe hazard of erosion, this soil is generally unsuited to cultivated crops and to hay. It is poorly suited to pasture. If the pasture is overgrazed or is plowed during seedbed preparation, erosion is a severe hazard. No-till seeding reduces this hazard.

Most areas support native hardwoods. This soil is well suited to trees. Erosion can be controlled by seeding log landings, skid trails, and logging roads after the trees are harvested. Water bars also help to control erosion on skid trails and logging roads. The slope limits the use of equipment. Logging equipment can be operated in the less sloping areas above or below this soil.

Because of the steep slope, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. Developing sites for recreational and urban uses is very difficult. The hazard of erosion is very severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible.

The land capability classification is VIe. The woodland ordination symbol is 5R.

EmB—Elkinsville-Urban land complex, 1 to 8 percent slopes. This map unit occurs as areas of a deep, well drained, gently sloping Elkinsville soil intermingled with areas of Urban land. The unit is on terraces along streams. Areas are irregularly shaped and range from 25 to 150 acres in size. Most are about 40 percent Elkinsville silt loam and 40 percent Urban land. The Elkinsville soil and the Urban land occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Elkinsville soil has a surface layer of brown, friable silt loam about 10 inches thick. The subsoil is yellowish brown, strong brown, and dark brown, friable and firm silt loam about 50 inches thick. The substratum to a depth of about 70 inches is dark brown, friable loam. In some areas the soil is moderately well drained. In a few areas the subsoil has more sand. In places the soil has been altered. Some of the low areas have been filled or leveled during construction, and other small areas have been cut, built up, or smoothed.

The Urban land is covered by buildings, streets, parking lots, and other structures that so obscure or alter the soil that identification of the soil series is not feasible.

Included in this unit in mapping are small areas of the poorly drained Peoga and somewhat poorly drained Weinbach soils in depressions and small areas of Shelocta soils on toe slopes and alluvial fans. Shelocta soils have a higher content of coarse fragments in the subsoil than the Elkinsville soil. Also included are areas that are subject to rare flooding. Included soils make up about 20 percent of the unit.

Permeability is moderate in the Elkinsville soil. Available water capacity is high. Runoff is slow or medium. The potential for frost action is high. The subsoil is very strongly acid to medium acid.

The Elkinsville soil is used for lawns, gardens, and parks. It is well suited to lawns, trees, shrubs, vegetables, and flower gardens. The lawns and gardens can be improved by additions of lime, fertilizer, mulch, and organic matter. The surface layer crusts after hard rains. Unless the surface is blanketed with topsoil, establishing vegetation is difficult in the included areas that have been cut and filled.

The Elkinsville soil is well suited to dwellings and septic tank absorption fields. A moderate shrink-swell potential is a limitation on sites for dwellings. Properly designing foundations and footings and backfilling along foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Providing suitable base material under local roads and streets minimizes the road damage caused by low strength and frost action. The included areas that are subject to flooding are generally unsuitable as sites for buildings.

The Elkinsville soil is assigned the land capability classification IIe. It is not assigned a woodland ordination symbol. The Urban land is not assigned a land capability classification or a woodland ordination symbol.

ErD—Ernest silt loam, 15 to 25 percent slopes. This deep, moderately well drained, moderately steep soil is on colluvial foot slopes along the edges of preglacial valleys. Most areas are long and narrow and range from 5 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The upper part of the subsoil is yellowish brown, friable silt loam and channery silt loam.

The lower part to a depth of about 60 inches is a fragipan of yellowish brown, very firm and brittle channery loam and loam. The subsoil is mottled below a depth of about 15 inches. In some areas the soil is well drained. In other areas it does not have a fragipan.

Included with this soil in mapping are small areas of Omulga and Monongahela soils on terrace remnants. These soils have fewer coarse fragments in the subsoil than the Ernest soil. They make up about 15 percent of the unit.

Permeability is moderate above the fragipan in the Ernest soil and slow or moderately slow in the fragipan. Available water capacity is low. Runoff is rapid. The soil can be easily tilled. The subsoil is very strongly acid or strongly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

This soil is poorly suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Some areas are used as hayland and pasture. This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Many areas are used as woodland. This soil is moderately well suited to trees. Coves and north- and east-facing slopes are the best woodland sites. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Plant competition can be controlled by spraying, cutting, or girdling. Locating skid trails and logging roads on or nearly on the contour reduces the hazard of erosion and facilitates the use of equipment. Establishing water bars and seeding landings, skid trails, and logging roads after the trees are logged also reduce the hazard of erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams.

Because of the slope, the seasonal wetness, and the slow or moderately slow permeability, this soil is poorly suited to dwellings and septic tank absorption fields. Land shaping is needed in most areas. Where a building site is developed by cutting and filling, a retaining wall is commonly needed to prevent downslope movement of the soil above the building site. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. Local roads should be built across the slope. Providing suitable base material minimizes the road damage caused by low strength.

Interceptor drains are needed upslope from septic tank absorption fields. Installing the absorption field on the contour minimizes seepage of the effluent to the surface. Aeration sewage disposal systems are used in some areas.

The land capability classification is IVe. The woodland ordination symbol is 4R.

FcA—Fitchville silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained, nearly level soil is on terraces along streams. Most areas are circular or are long and narrow. They range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is grayish brown and yellowish brown, mottled, friable and firm silty clay loam about 45 inches thick. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm silty clay loam.

Included with this soil in mapping are small areas of Elkinsville, Peoga, Sardinia, and Weinbach soils. The well drained Elkinsville and moderately well drained Sardinia soils are on slight rises and gradual slope breaks. Peoga and Weinbach soils are along drainageways and in depressions. Peoga soils are poorly drained. Weinbach soils have a fragipan. Also included are areas that are subject to rare flooding. Included soils make up about 10 percent of the unit.

Permeability is moderately slow in the Fitchville soil, and available water capacity is high. Runoff is slow. The surface layer can be easily tilled. The subsoil is commonly medium acid. A perched seasonal high water table is at a depth of 1.0 to 2.5 feet during extended wet periods.

Most areas of this soil are used as cropland. Drained areas are well suited to corn, soybeans, and small grain. The seasonal wetness is the major limitation. A drainage system is needed. Surface and subsurface drains can remove excess water where adequate outlets are available. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, maintains soil structure, and improves tilth.

Drained areas of this soil are well suited to grasses and legumes for hay and pasture. Surface and subsurface drains can remove excess water where adequate outlets are available. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted grazing during wet periods help to keep the pasture in good condition. When a new stand is established, the species that can withstand some wetness should be selected for planting.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to dwellings and septic tank absorption fields because of the moderately slow permeability and the seasonal wetness. The moderately slow permeability can be somewhat offset by using an aeration system or by enlarging the absorption field. Installing perimeter drains around the absorption field lowers the water table. Properly landscaping building sites helps to keep surface water away from foundations. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. The included areas that are subject to rare flooding are generally unsuitable for building site development.

The land capability classification is IIw. The woodland ordination symbol is 5A.

Ge—Genesee silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains. Most areas are long and narrow, circular, or irregularly shaped and range from 5 to 100 acres in size. Slope is 0 to 2 percent.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The substratum to a depth of about 82 inches is dark yellowish brown and brown, friable silt loam, loam, and sandy loam. In some areas the soil has less clay or more silt within a depth of 40 inches. In a few areas it is moderately well drained. In places it is frequently flooded.

Included with this soil in mapping are small areas of Huntington soils in the slightly higher landscape positions. These soils have a surface layer that is darker than that of the Genesee soil and contain less sand between depths of 10 and 40 inches. They make up about 5 percent of the unit.

Permeability is moderate in the Genesee soil. Available water capacity is high or very high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The substratum is slightly acid to moderately alkaline.

Most areas are farmed. This soil is well suited to corn and soybeans. Small grain, such as winter wheat, can be damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in spring. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the flooding, this soil is generally unsuited to dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

Ha—Haymond silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains. It is occasionally flooded during the growing season. Most areas are long and narrow and range from 5 to 100 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The substratum to a depth of about 78 inches is dark yellowish brown and yellowish brown, friable silt loam and loam. In some areas the soil has more clay, more sand, or both.

Included with this soil in mapping are small areas of Piopolis, Stendal, and Skidmore soils. The poorly drained and very poorly drained Piopolis and somewhat poorly drained Stendal soils are in slight depressions. Skidmore soils are on alluvial fans. They have a higher content of coarse fragments directly below the surface layer than the Haymond soil. Included soils make up about 10 percent of the unit.

Permeability is moderate in the Haymond soil, and available water capacity is very high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The root zone is typically medium acid or slightly acid.

Most areas are farmed. This soil is well suited to corn and soybeans. Small grain, such as winter wheat, can be damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in spring. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the flooding, this soil is generally unsuited to dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

Hu—Huntington silt loam, occasionally flooded. This deep, well drained, nearly level soil is on the higher parts of flood plains. Most areas are circular or are long and narrow. They range from 5 to 70 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam. It is about 5 inches thick. The subsoil is brown and yellowish brown, friable silt loam about 29 inches thick. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam and loam. In some areas the surface layer is lighter colored. In a few areas the soil is moderately well drained. In places the subsoil has a higher content of sand. In some low areas the soil is frequently flooded.

Included with this soil in mapping are small areas of Landes soils on slope breaks and low rises. These soils are more droughty than the Huntington soil. They make up about 5 percent of the unit.

Permeability is moderate in the Huntington soil, and available water capacity is high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is neutral or mildly alkaline.

Most areas are farmed. This soil is well suited to corn and soybeans. Small grain, such as winter wheat, can be damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in spring. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition can be controlled by spraying, cutting, or girdling.

Because of the flooding, this soil is generally unsuited to dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

La—Landes fine sandy loam, occasionally flooded. This deep, well drained, gently sloping soil is on slope breaks between flood plains and low terraces. Most areas are long and narrow or are circular. They range from 5 to 20 acres in size. Slope ranges from 1 to 7 percent.

Typically, the surface layer is dark brown, friable fine sandy loam about 6 inches thick. The subsurface layer also is dark brown, friable fine sandy loam. It is about 5 inches thick. The subsoil is dark yellowish brown, friable fine sandy loam about 11 inches thick. The substratum to a depth of about 60 inches is yellowish brown, very friable loamy fine sand and fine sandy loam. In some areas the surface layer is lighter colored.

Included with this soil in mapping are small areas of Huntington, Nolin, and Rossburg soils. These soils have more clay in the subsoil than the Landes soil. Huntington and Rossburg soils are in landscape positions similar to those of the Landes soil. Nolin soils are on the lower parts of flood plains. Included soils make up about 10 percent of the unit.

Permeability is rapid in the Landes soil. Available water capacity is moderate. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is neutral or mildly alkaline.

Most areas are used as cropland. This soil is well suited to corn and soybeans. Flooding damages small grain. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the available water capacity. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

Some areas are used as hayland and pasture. This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition can be controlled by spraying, cutting, or girdling.

Because of the flooding and a poor filtering capacity, this soil is generally unsuited to dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

LbC—Latham silt loam, 8 to 15 percent slopes. This moderately deep, moderately well drained, strongly sloping soil is on convex ridgetops that are 100 to 250 feet wide. Most areas are long and narrow and range from 10 to 80 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 29 inches thick. The upper part is yellowish brown, firm silt loam, and the lower part is yellowish brown and strong brown, mottled, firm silty clay loam and silty clay. Yellowish brown siltstone bedrock is at a depth of about 36 inches. In some areas the subsoil is redder. In places the upper part of the soil has less clay.

Included with this soil in mapping are small areas of Berks soils and small areas of shallow soils that have many coarse fragments throughout. The included soils are on the very narrow parts of the convex ridgetops and on the higher parts. They make up about 15 percent of the unit.

Permeability is slow in the Latham soil. Available water capacity is low. Runoff is rapid. The shrink-swell potential is high. The subsoil is very strongly acid or strongly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

This soil is poorly suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping system should include a high proportion of long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by increasing the planting rate. The windthrow hazard can be reduced by harvesting techniques that do not isolate the remaining trees or leave them widely spaced and by a border of conifers along the edge of the woodland.

This soil is poorly suited to dwellings and septic tank absorption fields. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Properly designing foundations and footings and backfilling excavations around walls and foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Installing drains at the base of footings and coating the exterior of basement walls help to overcome the wetness. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads and streets caused by low strength, frost action, and shrinking and swelling.

The bedrock between depths of 20 and 40 inches, the slow permeability, and the seasonal wetness are severe limitations on sites for septic tank absorption fields. Installing the absorption field in suitable fill material or using an aeration system helps to overcome these limitations. Installing interceptor drains upslope from the absorption field reduces the wetness. Installing the distribution lines on the contour minimizes the seepage of effluent to the surface.

The land capability classification is IVe. The woodland ordination symbol is 3C.

LbD—Latham silt loam, 15 to 25 percent slopes. This moderately deep, moderately well drained, moderately steep soil is on hillsides and ridgetops in the uplands. Most areas are irregularly shaped and range from 5 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 33 inches thick. The upper part is strong brown, friable silt loam, and the lower part is yellowish brown and strong brown, mottled, friable and firm silty clay loam and shaly silty clay. Weathered siltstone bedrock is at a depth of about 38 inches. In some small areas the subsoil is redder.

Included with this soil in mapping are narrow strips of the deep Shelocta and Wharton soils on hillsides. These soils make up about 15 percent of the unit.

Permeability is slow in the Latham soil. Available water capacity is low. Runoff is very rapid. The shrink-swell potential is high. The subsoil is very strongly acid or strongly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Some areas are used for hay and pasture. Because of the moderately steep slope and a very severe hazard of erosion, this soil is generally unsuited to cultivated crops. It is poorly suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Most areas support native hardwoods. This soil is moderately well suited to trees. Coves and north- and east-facing slopes are the best woodland sites. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding landings, skid trails, and logging roads after the trees are harvested and establishing water bars also help to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking. Harvesting techniques that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard.

This soil is generally unsuited to dwellings and septic tank absorption fields because of the slope, the depth to bedrock, the seasonal wetness, the high shrink-swell potential, and the slow permeability.

The land capability classification is VIe. The woodland ordination symbol is 4R on north aspects, 3R on south aspects.

LcE—Latham-Brownville-Shelocta association, steep. These soils are on side slopes and foot slopes in the uplands. The moderately deep, moderately well drained Latham soil occurs as bands on the side slopes. The deep, well drained Brownsville soil is on the upper part of the side slopes. The deep, well drained Shelocta soil is on lower parts of the side slopes and on foot slopes. Slope is dominantly 25 to 40 percent. Areas are irregularly shaped and range from 100 to 500 acres in size. They generally are about 45 percent Latham silt loam, 25 percent Brownsville silt loam, and 25 percent Shelocta silt loam. Because of present and anticipated land uses, separating the three soils in mapping was not considered practical.

Typically, the Latham soil has a surface layer of brown, friable silt loam about 3 inches thick. The subsoil is about 33 inches thick. The upper part is yellowish brown, firm silty clay loam and silty clay, and the lower part is brown and reddish yellow, mottled, firm silty clay and channery silty clay loam. Slightly weathered shale bedrock is at a depth of about 33 inches. In some areas the soil has less clay in the subsoil and is deep over bedrock. In a few areas the subsoil is redder.

Typically, the Brownsville soil has a surface layer of yellowish brown, friable silt loam about 6 inches thick. The subsoil is about 35 inches thick. It is light yellowish brown. The upper part is friable channery silt loam, and the lower part is friable and firm extremely channery silt loam. The substratum to a depth of about 60 inches is light yellowish brown, firm extremely channery silt loam.

Typically, the Shelocta soil has a surface layer of dark yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 52 inches thick. The upper part is yellowish brown and strong brown, friable and firm silt loam and silty clay loam, and the lower part is yellowish brown and brown, firm silty clay loam and channery silt loam. The substratum is yellowish brown, friable very channery silt loam. Hard siltstone bedrock is at a depth of about 60 inches. In places sandstone or siltstone bedrock is at a depth of 20 to 40 inches. In some areas on foot slopes, the slope is less than 25 percent. In some areas the soil is moderately well drained. In a few places the subsoil is thinner.

Included with these soils in mapping are areas of Berks and Skidmore soils. The moderately deep Berks soils are on the upper part of the slopes. Skidmore soils irregularly decrease in content of organic matter with increasing depth. They are on flood plains. Also included are rock outcrops on steep escarpments. Included areas are less than 15 acres in size. They make up about 5 percent of the association.

Permeability is slow in the Latham soil, moderate or moderately rapid in the Brownsville soil, and moderate in the Shelocta soil. Available water capacity is low in the Latham soil, low or moderate in the Brownsville soil, and moderate in the Shelocta soil. Runoff is rapid or very rapid on all three soils. The shrink-swell potential is high in the Latham soil and low in the Brownsville and Shelocta soils. The subsoil of the Latham and Shelocta soils is very strongly acid or strongly acid, and that of the Brownsville soil is strongly acid to extremely acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet in the Latham soil.

Some areas are used for hay and pasture. Because of the steep slope and a very severe hazard of erosion, these soils are generally unsuited to cultivated crops. They are poorly suited to hay and pasture. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Most areas support native hardwoods. These soils are moderately well suited to trees. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding log landings, skid trails, and logging roads after the trees are harvested and establishing water bars also help to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate on the Latham and Brownsville soils. Seedling losses can be offset by overstocking. Windthrow is a hazard on the Latham soil. This hazard can be reduced by harvesting techniques that do not isolate the remaining trees or leave them widely spaced.

Mainly because of the steep slope, these soils are generally unsuitable as sites for dwellings and sanitary facilities. Other limitations, in areas of the Latham soil, are restricted permeability, bedrock between depths of 20 and 40 inches, seasonal wetness, and a high shrink-swell potential. Developing sites for recreational and urban uses is very difficult. Cutting and filling increase the hazard of hillside slippage. Some areas are scenic and have potential as sites for hiking trails and lookout points. The hazard of erosion is very severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible. Local roads should be built across the slope. Seeding and mulching roadbanks can minimize gullying.

The land capability classification is VIe. The woodland ordination symbol assigned to the Latham and Brownville soils is 4R on north aspects, 3R on south aspects; that assigned to the Shelocta soil is 4R on north and south aspects.

LgD—Latham-Gilpin association, hilly. These moderately deep soils are on ridgetops and shoulder slopes. The moderately well drained Latham soil has a slope of dominantly 8 to 15 percent. It is on convex ridgetops and on some shoulder slopes. The well drained Gilpin soil has a slope of dominantly 12 to 20 percent. It is on the shoulder slopes. Areas generally are long and are 80 to 300 feet wide. They range from 10 to 100 acres in size. Most are about 50 percent Latham silt loam and 35 percent Gilpin silt loam. Because of present and anticipated land uses, mapping the two soils separately was not considered practical or necessary.

Typically, the Latham soil has a surface layer of brown, friable silt loam about 3 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown and strong brown, firm channery silt loam and silty clay loam, and the lower part is strong brown, mottled, firm silty clay. Weathered siltstone bedrock is at a depth of about 33 inches. In some areas the subsoil has less clay. In some small areas it is redder.

Typically, the Gilpin soil has a surface layer of yellowish brown, friable silt loam about 5 inches thick. The subsoil is about 23 inches of strong brown, friable silt loam, loam, and clay loam. Slightly weathered sandstone bedrock is at a depth of about 28 inches. In places the soil is deeper over bedrock. In some areas the subsoil has a lower content of sand and coarse fragments. In other areas it has gray mottles.

Included with these soils in mapping are areas of Berks, Coolville, and Tilsit soils and areas of shallow soils. Berks soils and the shallow soils have a higher content of coarse fragments in the subsoil than the Latham and Gilpin soils. They are on narrow ridgetops and on small knobs. The deep Coolville and Tilsit soils are on the wider, less sloping parts of the ridgetops. Included areas are less than 10 acres in size. They make up about 15 percent of the association.

Permeability is slow in the Latham soil and moderate in the Gilpin soil. Available water capacity is low in both soils. Runoff is rapid. The shrink-swell potential is high in the Latham soil and low in the Gilpin soil. The subsoil of both soils is very strongly acid or strongly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet in the Latham soil.

These soils are poorly suited to corn, soybeans, and small grain. They can be cropped successfully, but the cropping sequence should include a high proportion of long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. These soils are poorly suited to hay and pasture. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Most areas support native hardwoods. These soils are moderately well suited to trees. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment on the Gilpin soil. Water bars or other erosion-control measures also are needed. Planting seedlings that have been transplanted once reduces the seedling mortality rate on the Latham soil. Seedling losses can be offset by overstocking. Harvesting techniques that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard on the Latham soil.

These soils are poorly suited to septic tank absorption fields. Aeration sewage disposal systems are used in some areas. Suitable fill material can elevate the absorption fields a sufficient distance above the bedrock and can improve the ability of the Latham soil to absorb effluent. Installing interceptor drains upslope from the absorption fields reduces the seasonal wetness of the Latham soil.

These soils are poorly suited to dwellings because of the slope and depth to bedrock of both soils and the seasonal wetness and high shrink-swell potential of the Latham soil. Land shaping is needed in many areas. The bedrock can be ripped in most areas. Installing drains at the base of footings and coating the exterior of basement walls reduce the wetness of the Latham soil. Backfilling along foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling of the Latham soil. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. Local roads should be built across the slope. Providing suitable base material and installing a drainage system in the Latham soil minimize the road damage caused by frost action and low strength.

The land capability classification is IVe. The woodland ordination symbol assigned to the Latham soil is 3C, and that assigned to the Gilpin soil is 4R.

LsD—Latham-Steinsburg association, hilly. These moderately deep soils are on shoulder slopes and narrow ridgetops. The moderately well drained Latham soil is on the shoulder slopes. The well drained Steinsburg soil is on the narrow ridgetops and on a few shoulder slopes. Slopes are dominantly 10 to 25 percent. Most areas are long and are 20 to 150 feet wide. They range from 5 to 50 acres in size. They are about 50 percent Latham silt loam and 35 percent Steinsburg sandy loam. Because of present and anticipated land uses, mapping the two soils separately was not considered practical or necessary.

Typically, the Latham soil has a surface layer of brown, friable silt loam about 5 inches thick. The subsoil is about 33 inches thick. The upper part is strong brown, friable silt loam, and the lower part is yellowish brown and strong brown, mottled, friable and firm silty clay loam and shaly silty clay loam. Slightly weathered shale bedrock is at a depth of about 38 inches. In some areas the subsoil has less clay. In a few areas it is redder.

Typically, the Steinsburg soil has a surface layer of yellowish brown, friable sandy loam about 8 inches thick. The subsoil is light yellowish brown, yellowish brown, and strong brown, friable sandy loam about 25 inches thick. Weakly cemented sandstone bedrock is at a depth of about 33 inches. In places sandstone or siltstone bedrock is at a depth of less than 24 or more than 40 inches. In some areas the surface layer is channery sandy loam. In other areas the subsoil has a higher content of clay or of coarse fragments.

Included with these soils in mapping are areas of Gilpin and Wharton soils on the wider parts of ridgetops and on shoulder slopes. Gilpin soils have more clay in the subsoil than the Steinsburg soil. Wharton soils are deep over bedrock. Included areas are less than 10 acres in size. They make up about 15 percent of the association.

Permeability is slow in the Latham soil and moderately rapid in the Steinsburg soil. Available water capacity is low in the Latham soil and low or very low in the Steinsburg soil. Runoff is rapid or very rapid on the Latham soil and rapid on the Steinsburg soil. The shrink-swell potential is high in the Latham soil. The subsoil of the Latham soil is very strongly acid or strongly acid, and that of the Steinsburg soil is strongly acid. The Latham soil has a perched seasonal high water table at a depth of 1.5 to 3.0 feet during extended wet periods.

Access to most areas of this association is limited because the adjacent slopes are very steep. Some areas are used for hay and pasture. Because of the slope and a severe hazard of erosion, these soils are generally unsuited to cultivated crops. They are poorly suited to hay and pasture. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Most areas support native hardwoods. These soils are moderately well suited to trees. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding log landings, skid trails, and logging roads after the trees are harvested helps to control erosion. Water bars or other erosion-control measures also are needed. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking. The windthrow hazard can be reduced by harvesting techniques that do not isolate the remaining trees or leave them widely spaced.

These soils are generally unsuitable as sites for septic tank absorption fields and dwellings because of the slope and depth to bedrock in areas of both soils and the seasonal wetness, slow permeability, and high shrink-swell potential of the Latham soil.

The land capability classification is VIe. The woodland ordination symbol is 4R on north aspects, 3R on south aspects.

MoB—Monongahela silt loam, 1 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is in preglacial valleys. Areas are long and narrow or are irregularly shaped. They range from 10 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The upper part of the subsoil is yellowish brown, mottled, friable silt loam. The next part is a fragipan of yellowish brown and brown, mottled, very firm, brittle loam and sandy clay loam. The lower part to a depth of about 72 inches is strong brown, very firm, brittle sandy clay loam and sandy loam. In some areas the subsoil has less sand. In other areas the soil does not have a fragipan. In a few places it is well drained.

Included with this soil in mapping are small areas of Haymond and Wyatt soils. The well drained Haymond soils are on flood plains. Wyatt soils are in landscape positions similar to those of the Monongahela soil. They have more clay in the subsoil than the Monongahela soil. Included soils make up about 5 percent of the unit.

Permeability is moderate above the fragipan in the Monongahela soil and slow or moderately slow in the fragipan. The root zone is mainly restricted to the 18 to 30 inches above the fragipan. This zone has a low available water capacity. Runoff is slow or medium. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is very strongly acid to medium acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to septic tank absorption fields because the seasonal wetness and the slow or moderately slow permeability are severe limitations. The effects of these limitations can be minimized by the use of an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness.

This soil is moderately well suited to dwellings. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Properly landscaping building sites helps to keep surface water away from foundations. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by wetness and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The land capability classification is IIe. The woodland ordination symbol is 4A.

MoC2—Monongahela silt loam, 8 to 15 percent slopes, eroded. This deep, moderately well drained, strongly sloping soil is in dissected areas in preglacial valleys. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are long and narrow or are irregularly shaped. They range from 5 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The upper part of the subsoil is yellowish brown, friable silt loam and loam. The next part is a fragipan of yellowish brown, strong brown, and brown, very firm, brittle loam and sandy clay loam. The lower part to a depth of about 70 inches is strong brown, firm sandy clay loam. The subsoil is mottled between depths of about 13 and 57 inches. In some areas the soil does not have a fragipan. In a few areas it is well drained. In places the subsoil has less sand.

Included with this soil in mapping are small areas of Ernest, Haymond, and Wyatt soils. Ernest soils are on foot slopes and toe slopes. They have a higher content of angular coarse fragments in the subsoil than the Monongahela soil. The well drained Haymond soils are on flood plains. Wyatt soils are in landscape positions similar to those of the Monongahela soil. They have more clay in the subsoil than the Monongahela soil. Included soils make up about 5 percent of the unit.

Permeability is moderate above the fragipan in the Monongahela soil and slow or moderately slow in the fragipan. The root zone is restricted mainly to the 18 to 30 inches above the fragipan. This zone has a low available water capacity. Runoff is rapid. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is very strongly acid to medium acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Most areas are used as cropland or pasture. This soil is moderately well suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to septic tank absorption fields because the seasonal wetness and the slow or moderately slow permeability are severe limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness.

This soil is moderately well suited to dwellings. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. The buildings should be designed so that they conform to the natural slope of the land. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by wetness and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

No—Nolin silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains. Most areas are long and wide, circular, or irregularly shaped. They range from 5 to 750 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark grayish brown, friable silt loam about 11 inches thick. The subsoil is about 46 inches of brown and dark yellowish brown, firm silty clay loam and friable silt loam. The substratum to a depth of about 66 inches is yellowish brown, mottled, friable silt loam. In some areas the surface layer is darker. In other areas the subsoil has more sand. In a few areas the surface layer is silty clay loam. In places the soil is frequently flooded.

Included with this soil in mapping are small areas of Landes and Stendal soils. Landes soils are in the slightly higher areas. They have more sand in the subsoil than the Nolin soil. The somewhat poorly drained Stendal soils are in slight depressions and in drainageways. Included soils make up about 5 percent of the unit.

Permeability is moderate in the Nolin soil. Available water capacity is very high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is neutral or mildly alkaline.

Most areas are farmed. This soil is well suited to corn and soybeans. Small grain, such as winter wheat, can be damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in spring. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition can be controlled by spraying, cutting, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

OcB—Ockley loam, 1 to 8 percent slopes. This deep, well drained, gently sloping soil is on river terraces. Areas generally are circular or are long and narrow. They range from 5 to 60 acres in size.

Typically, the surface layer is brown, friable loam about 10 inches thick. The subsoil is about 41 inches thick. The upper part is yellowish brown and strong brown, friable loam and clay loam, and the lower part is brown, friable gravelly clay loam and gravelly sandy clay loam. The substratum to a depth of about 74 inches is yellowish brown, friable very gravelly loamy coarse sand. In some areas the subsoil has less sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Fitchville soils in depressions and along drainageways. Also included are areas that are subject to rare flooding. Included soils make up about 5 percent of the unit.

Permeability is moderate in the subsoil of the Ockley soil and very rapid in the substratum. Available water capacity is moderate. Runoff is slow or medium. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The shrink-swell potential is moderate. The subsoil is commonly medium acid in the upper part and medium acid to neutral in the lower part.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Row crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is well suited to septic tank absorption fields, dwellings, and local roads and streets. Properly designing the foundations and footings of dwellings and backfilling excavations around walls and foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Providing suitable base material for local roads and streets minimizes the damage caused by low strength and frost action. The included areas that are subject to rare flooding are generally unsuitable as sites for buildings.

The land capability classification is IIe. The woodland ordination symbol is 4A.

OmB—Omulga silt loam, 1 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is in preglacial valleys. Most areas are long and narrow or are irregularly shaped. They range from 5 to 220 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 69 inches thick. The upper part is yellowish brown, friable silt loam and friable and firm silty clay loam; the next part is a fragipan of yellowish brown, very firm silty clay loam; and the lower part is yellowish brown, friable silty clay loam and firm silty clay and clay. The subsoil is mottled between depths of about 20 and 50 inches. The substratum to a depth of about 85 inches is brown, very firm clay. In some areas the soil has more sand.

Included with this soil in mapping are small areas of Doles and Wyatt soils. The somewhat poorly drained Doles soils are along drainageways. Wyatt soils contain more clay in the subsoil than the Omulga soil. They are on convex slopes. Also included are small areas of well drained, moderately deep soils on short, steep slopes. Included soils make up about 5 percent of the unit.

Permeability is moderate above the fragipan in the Omulga soil and slow in the fragipan. The root zone is restricted mainly to the 18 to 36 inches above the fragipan. This zone has a low or moderate available water capacity. Runoff is slow or medium. The surface layer can be easily tilled. The shrink-swell potential is moderate. The subsoil is extremely acid to medium acid. A perched seasonal high water table is at a depth of 2.0 to 3.5 feet during extended wet periods.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion (fig. 8). Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to septic tank absorption fields because the wetness and the slow permeability are severe limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness.

This soil is moderately well suited to dwellings and local roads. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Properly landscaping building sites helps to keep surface water away from foundations. Backfilling along foundations with material that has a low shrink-swell potential minimizes the structural damage caused by shrinking and swelling. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The land capability classification is IIe. The woodland ordination symbol is 4A.

OmC—Omulga silt loam, 8 to 15 percent slopes. This deep, moderately well drained, strongly sloping soil is in preglacial valleys. Areas are long and narrow and range from 5 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 52 inches thick. It is mottled below a depth of about 20 inches. The upper part is yellowish brown, friable silt loam, and the lower part is a fragipan of yellowish brown, very firm, brittle silt loam and silty clay loam. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm silty clay. In some areas the soil does not have a fragipan. In a few areas it has more sand throughout.

Included with this soil in mapping are small areas of Doles and Wyatt soils. The somewhat poorly drained Doles soils are along drainageways. Wyatt soils contain more clay in the subsoil than the Omulga soil. They are on side slopes. Also included are small areas of well drained, moderately deep soils on short, steep slopes. Included soils make up about 5 percent of the unit.

Permeability is moderate above the fragipan in the Omulga soil and slow in the fragipan. The root zone is restricted mainly to the 18 to 36 inches above the fragipan. This zone has a low or moderate available water capacity. Runoff is rapid. The surface layer can be easily tilled. The shrink-swell potential is moderate. The subsoil is extremely acid to medium acid. A perched

Figure 8.—A protective cover of crop residue on Omulga silt loam, 1 to 8 percent slopes.

seasonal high water table is at a depth of 2.0 to 3.5 feet during extended wet periods.

Most areas are used as cropland or pasture. This soil is moderately well suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to septic tank absorption fields because the seasonal wetness and the slow permeability are severe limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness.

This soil is moderately well suited to dwellings. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. The buildings should be designed so that they conform to the natural slope of the land. Backfilling along foundations with material that has a low shrink-swell potential minimizes the structural damage caused by shrinking and swelling. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

OpB—Omulga-Urban land complex, 1 to 8 percent slopes. This map unit occurs as areas of a deep, moderately well drained, gently sloping Omulga soil intermingled with areas of Urban land. The unit is in preglacial valleys. Areas range from 30 to 150 acres in size. Most are about 50 percent Omulga silt loam and 30 percent Urban land. The Omulga soil and the Urban land occur as areas so intricately mixed or so small that separating them in mapping is not practical.

Typically, the Omulga soil has a surface layer of brown, friable silt loam about 10 inches thick. The subsoil is about 69 inches thick. The upper part is yellowish brown, friable silt loam and friable and firm silty clay loam; the next part is a fragipan of yellowish brown, very firm silty clay loam; and the lower part is yellowish brown, friable silty clay loam and firm silty clay and clay. The subsoil is mottled between depths of about 20 and 50 inches. The substratum to a depth of about 85 inches is brown, very firm clay. In places the soil has been altered. Some of the low areas have been filled or leveled during construction, and other small areas have been cut, built up, or smoothed. In a few places the soil has more sand throughout.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not feasible.

Included in this unit in mapping are small areas of the somewhat poorly drained Doles soils in depressions; small areas of moderately deep, well drained soils on short, steep slopes; and small areas of Wyatt soils on convex slopes. Wyatt soils contain more clay in the subsoil than the Omulga soil. Included soils make up about 20 percent of the unit.

Permeability is moderate above the fragipan in the Omulga soil and slow in the fragipan. The root zone is restricted mainly to the 18 to 36 inches above the fragipan. This zone has a low or moderate available water capacity. Runoff is slow or medium. The shrink-swell potential is moderate. The subsoil is extremely acid to medium acid. A perched seasonal high water table is at a depth of 2.0 to 3.5 feet during extended wet periods.

The Omulga soil is used for lawns, gardens, and parks. It is well suited to lawns, trees, shrubs, and vegetable and flower gardens. The lawns and gardens can be improved by additions of lime, fertilizer, mulch, and organic matter. The surface layer crusts after hard rains. Unless a blanket of topsoil is added, establishing vegetation is difficult in the included areas that have been cut and filled.

The Omulga soil is poorly suited to septic tank absorption fields because the seasonal wetness and the slow permeability are severe limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness. Sanitary facilities should be connected to sewers and sewage treatment facilities wherever possible.

The Omulga soil is moderately well suited to dwellings and local roads. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Properly landscaping building sites helps to keep surface water away from foundations. Backfilling along foundations with material that has a low shrink-swell potential minimizes the structural damage caused by shrinking and swelling. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The Omulga soil is in land capability classification IIe. It is not assigned a woodland ordination symbol. The Urban land is not assigned a land capability classification or a woodland ordination symbol.

OpC—Omulga-Urban land complex, 8 to 15 percent slopes. This map unit occurs as areas of a deep, moderately well drained, strongly sloping Omulga soil intermingled with areas of Urban land. The unit is in dissected areas in preglacial valleys. Areas range from 10 to 60 acres in size and are long and narrow. Most are about 55 percent Omulga silt loam and 35 percent Urban land. The Omulga soil and the Urban land occur as areas so intricately mixed or so small that separating them in mapping is not practical.

Typically, the Omulga soil has a surface layer of brown, friable silt loam about 7 inches thick. The subsoil is about 52 inches thick. It is mottled below a depth of about 20 inches. The upper part is yellowish brown, friable silt loam, and the lower part is a fragipan of yellowish brown, very firm, brittle silt loam and silty clay loam. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm silty clay. In some areas the soil does not have a fragipan. In some eroded areas the subsoil is thinner. In places the soil has been altered. Some of the low areas have been filled or leveled during construction, and other small areas have been cut, built up, or smoothed. In a few places the soil has more sand throughout.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not feasible.

Included in this unit in mapping are small areas of the somewhat poorly drained Doles soils along drainageways and small areas of Wyatt soils on side slopes. Wyatt soils contain more clay in the subsoil than the Omulga soil. Included soils make up about 10 percent of the unit.

Permeability is moderate above the fragipan in the Omulga soil and slow in the fragipan. The root zone is restricted mainly to the 18 to 36 inches above the fragipan. This zone has a low or moderate available water capacity. Runoff is rapid. The shrink-swell potential is moderate. The subsoil is extremely acid to medium acid. A perched seasonal high water table is at a depth of 2.0 to 3.5 feet during extended wet periods.

The Omulga soil is used for lawns, gardens, and parks. It is well suited to lawns, trees, shrubs, and vegetable and flower gardens. The lawns and gardens can be improved by the additions of lime, fertilizer, mulch, and organic matter. The surface layer crusts after hard rains. Unless a blanket of topsoil is added, establishing vegetation is difficult in the included areas that have been cut and filled.

The Omulga soil is poorly suited to septic tank absorption fields because the seasonal wetness and the slow permeability are severe limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness. Sanitary facilities should be connected to sewers and sewage treatment facilities wherever possible.

The Omulga soil is moderately well suited to dwellings and local roads. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Backfilling along foundations with material that has a low shrink-swell potential minimizes the structural damage caused by shrinking and swelling. The buildings should be designed so that they conform to the natural slope of the land. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The Omulga soil is in land capability classification IIIe. It is not assigned a woodland ordination symbol. The Urban land is not assigned a land capability classification or a woodland ordination symbol.

Pe—Peoga silt loam, rarely flooded. This deep, poorly drained, nearly level soil is on flats and in depressions on terraces. Slope is 0 to 2 percent. Most areas are long and narrow or are irregularly shaped. They range from 5 to 110 acres in size.

Typically, the surface layer is dark gray, friable silt loam about 13 inches thick. The subsurface layer is gray, friable silt loam about 2 inches thick. The subsoil is gray, mottled, firm silt loam about 34 inches thick. The substratum to a depth of about 82 inches also is gray, mottled, firm silt loam. In places the subsoil has more clay.

Included with this soil in mapping are narrow strips of the moderately well drained Sciotoville and somewhat poorly drained Weinbach soils in the slightly higher landscape positions. These soils make up about 5 percent of the unit.

Permeability is slow in the Peoga soil. Available water capacity is high or very high. Runoff is very slow. The subsoil commonly is strongly acid but in some areas is medium acid in the lower part. A seasonal high water table is near the surface during extended wet periods.

Most areas are used as cropland. This soil is moderately well suited to corn, soybeans, and small grain. The seasonal wetness and the flooding are management concerns. Surface and subsurface drains can improve drainage, but adequate drainage outlets are not available in many areas of this low lying soil. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction and improves tilth.

Because of the seasonal wetness and the flooding, this soil is only moderately well suited to grasses and legumes for hay and pasture. Surface and subsurface drains can remove excess water in areas where adequate outlets are available. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted grazing during wet periods help to keep the pasture in good condition. When new stands are established, the species that can withstand the wetness should be selected for planting.

This soil is moderately well suited to trees. Plant competition can be reduced by removing vines and the less desirable trees and shrubs. The trees can be planted and harvested only during dry periods unless modified equipment is used. The windthrow hazard can be reduced by applying harvesting techniques that do not isolate the remaining trees or leave them widely spaced and by maintaining a border of conifers along the edge of the woodland. Planting seedlings that have been transplanted once reduces the seedling mortality rate. The species selected for planting should be those that can withstand the wetness.

This soil is generally unsuited to dwellings and septic tank absorption fields because of the wetness, the rare flooding, and the slow permeability.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Po—Piopolis silt loam, ponded. This deep, poorly drained and very poorly drained, nearly level soil is on flood plains. It is frequently flooded for long periods and is ponded most of the year. The depth of the ponded water fluctuates with the amount of water received from the higher adjacent soils. Slope is 0 to 1 percent. Most areas are irregularly shaped and range from 5 to 50 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 5 inches thick. The substratum to a depth of about 60 inches is light brownish gray, gray, and light gray, friable silty clay loam. It is mottled below a depth of about 12 inches. In some areas the soil is not dominantly grayish to a depth of about 30 inches. In places it has more sand throughout.

Permeability is slow. Available water capacity is high. Runoff is very slow or ponded. The substratum is strongly acid or medium acid. The seasonal high water table is near or above the surface.

Most areas support wetland vegetation and are used as habitat for wetland wildlife. This soil is generally unsuited to cropland, pasture, woodland, building site development, septic tank absorption fields, and recreational uses because of the frequent flooding, the ponding, and the slow permeability. Drainage outlets cannot be easily established. The fluctuating water level limits the survival of many trees. Most areas provide good habitat for ducks, muskrats, and other wetland wildlife.

The land capability classification is Vw. No woodland ordination symbol is assigned.

Ps—Pits, gravel. This map unit occurs as surface-mined areas from which aggregate material has been removed for use in construction. It is on outwash terraces along rivers. Typically, it is adjacent to areas of Casco, Ockley, Wheeling, and other soils that are underlain by outwash gravel and sand. Most of the pits range from 5 to 70 acres in size. Actively mined ones are continually being enlarged. The pits characteristically have a high wall on one or more sides.

The material that is mined consists of stratified layers of gravel and sand. These layers vary in thickness and orientation. The kind and grain size of the aggregate material are relatively uniform within any one layer but commonly differ from layer to layer. Some layers contain a significant amount of silt and sand. Selectivity in mining is commonly feasible.

The material that remains after mining is poorly suited to plants. The organic matter content and available water capacity are low. Most unused gravel pits can be developed for use as wildlife habitat or as recreational areas. The pits excavated to or below the water table can be developed for use as wetland wildlife habitat.

No land capability classification or woodland ordination symbol is assigned.

Pt—Pits, quarry. This map unit occurs as surface-mined areas from which sandstone bedrock has been removed for use in construction. It is in areas where sandstone bedrock is close to the surface. Typically, it is adjacent to areas of Berks, Coolville, Shelocta, and Brownsville soils. Most of the quarries range from 5 to 200 acres in size. Actively mined ones are continually being enlarged. The quarries characteristically have a high wall on one or more sides.

The material that has been mined is fine or medium grained, porous sandstone. It is moderately hard and is light gray to light tan.

Included in this unit in mapping are large piles of overburden material.

The material remaining after mining is poorly suited to plants. The organic matter content and available water capacity are low. Some quarries contain water. Some areas are reverting to natural vegetation, whereas other areas support no vegetation.

No land capability classification or woodland ordination symbol is assigned.

RbC—Rarden silt loam, 8 to 15 percent slopes. This moderately deep, moderately well drained, strongly sloping soil is on convex ridgetops that are 100 to 250 feet wide. Areas are long and narrow and range from 10 to 80 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 26 inches thick. It is yellowish red and firm. The upper part is silty clay, and the lower part is mottled silty clay and channery silty clay. Yellowish brown siltstone bedrock is at a depth of about 32 inches. In some areas the subsoil is not so red. In other areas it has more silt in the upper part.

Included with this soil in mapping are small areas of Berks and Coolville soils and small areas of shallow soils. Berks soils and the shallow soils have a higher content of coarse fragments throughout than the Rarden soil. They are in landscape positions similar to those of the Rarden soil. The deep Coolville soils are on the less sloping parts of the ridgetops. Included soils make up about 15 percent of the unit.

Permeability is slow in the Rarden soil. Available water capacity is low. Runoff is rapid. The shrink-swell potential is high. The subsoil is very strongly acid or strongly acid. A perched seasonal high water table is at a depth of 2 to 3 feet during extended wet periods.

Most areas have been cleared and are used as cropland. This soil is moderately well suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include a high proportion of long-term hay or pasture. Erosion is a serious hazard. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking. Harvesting techniques that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard.

This soil is poorly suited to dwellings and septic tank absorption fields. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Properly designing foundations and footings and backfilling excavations around walls and foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads and streets caused by low strength, frost action, and shrinking and swelling.

The depth to bedrock, the slow permeability, and the seasonal wetness severely limit this soil as a site for septic tank absorption fields. The effects of these limitations can be minimized by additions of suitable fill material or by an aeration system. Installing interceptor drains upslope from the absorption fields reduces the wetness. Installing the distribution lines on the contour minimizes the seepage of effluent to the surface.

The land capability classification is IIIe. The woodland ordination symbol is 4C.

Ro—Rossburg silty clay loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains. Slope ranges from 0 to 3 percent. Most areas are circular or are long and narrow. They range from 50 to 100 acres in size.

Typically, the surface layer is dark brown, friable silty clay loam about 12 inches thick. The subsurface layer is very dark grayish brown, friable silty clay loam about 3 inches thick. The subsoil is about 29 inches of dark brown, dark yellowish brown, and yellowish brown, friable silt loam and loam. The substratum to a depth of about 80 inches is yellowish brown, very friable and loose loamy sand and sand. In some areas the subsoil has less sand. In a few areas the surface layer is lighter colored.

Included with this soil in mapping are small areas of Nolin soils in the slightly lower positions on the flood plains. These soils have a surface layer that is lighter colored than that of the Rossburg soil. They make up about 10 percent of the unit.

Permeability is moderate in the subsoil of the Rossburg soil and moderately rapid or rapid in the substratum. Available water capacity is high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is slightly acid to mildly alkaline.

Most areas are farmed. This soil is well suited to corn and soybeans. Small grain, such as winter wheat, can be damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in late spring. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition can be controlled by spraying, cutting, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 5A.

SaB—Sardinia silt loam, 1 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is on low terraces. Most areas are long and narrow or are circular. They range from 5 to 80 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 65 inches thick. The upper part is yellowish brown, friable silt loam; the next part is dark yellowish brown, mottled, firm silt loam; and the lower part is yellowish brown, mottled, friable loam. The substratum to a depth of about 80 inches is yellowish brown, mottled, friable silt loam. In some areas the soil is well drained.

Included with this soil in mapping are small areas of Fitchville, Peoga, and Wheeling soils. The somewhat poorly drained Fitchville and poorly drained Peoga soils are in depressions and along drainageways. The well drained Wheeling soils are on slight rises. Also included are areas that are subject to rare flooding. Included soils make up about 5 percent of the unit.

Permeability is moderate or moderately slow in the Sardinia soil. Available water capacity is high or very high. Runoff is slow or medium. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The shrink-swell potential is moderate. The subsoil is strongly acid to slightly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Most of the acreage is cropland. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to septic tank absorption fields because the seasonal wetness and the moderate or moderately slow permeability are limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness.

This soil is moderately well suited to dwellings and local roads. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Properly landscaping building sites helps to keep surface water away from foundations. Backfilling along foundations with material that has a low shrink-swell potential minimizes the structural damage caused by shrinking and swelling. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. The included areas that are subject to rare flooding are generally unsuitable as sites for buildings.

The land capability classification is IIe. The woodland ordination symbol is 5A.

SacB—Sciotoville silt loam, 1 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is in convex areas on terraces. Most areas are long and narrow or are irregularly shaped. They range from 5 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 13 inches thick. The subsoil is mottled silt loam about 46 inches thick. The upper part is brown and yellowish brown and is friable, and the lower part is a brown, very firm, brittle fragipan. The substratum to a depth of about 69 inches is brown, mottled, friable silt loam. In some areas the soil does not have a fragipan. In a few areas it is well drained.

Included with this soil in mapping are small areas of Weinbach and Wheeling soils. The somewhat poorly drained Weinbach soils are in small depressions and along drainageways. The well drained Wheeling soils are on slight rises. Also included are areas that are subject to rare flooding. Included soils make up about 2 percent of the unit.

Permeability is moderate above the fragipan in the Sciotoville soil and moderately slow or slow in the fragipan. The root zone is restricted mainly to the 24 to 38 inches above the fragipan. This zone has a moderate available water capacity. Runoff is slow or medium. The surface layer can be easily tilled. The part of the subsoil above the fragipan commonly is strongly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to septic tank absorption fields because the seasonal wetness and the slow or moderately slow permeability are severe limitations. The effects of these limitations can be minimized by an aeration system. Enlarging the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness.

This soil is moderately well suited to dwellings and local roads. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Properly landscaping building sites helps to keep surface water away from foundations. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. The included areas that are subject to rare flooding are generally unsuitable as sites for buildings.

The land capability classification is IIe. The woodland ordination symbol is 4A.

SbB—Shelocta silt loam, 3 to 8 percent slopes. This deep, well drained, gently sloping soil is on fans along valley walls and at the head of narrow stream valleys. Areas are long and narrow or are fan shaped. They range from 5 to 40 acres in size.

Typically, the surface layer is dark brown, firm silt loam about 9 inches thick. The subsoil is about 51 inches thick. The upper part is brown, firm silt loam and channery silt loam, and the lower part is yellowish brown, friable and firm silt loam and channery loam. In some areas the soil is moderately well drained. In a few areas it has a higher base saturation in the lower part.

Included with this soil in mapping are small areas of Haymond and Skidmore soils on flood plains. Haymond soils have a lower content of clay and coarse fragments between depths of 10 and 40 inches than the Shelocta soil. Skidmore soils have a higher content of coarse fragments in the subsoil than the Shelocta soil. Included soils make up about 10 percent of the unit.

Permeability is moderate in the Shelocta soil. Available water capacity is moderate or high. Runoff is medium. The subsoil is very strongly acid or strongly acid.

Some areas are used as cropland. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Many areas are used as homesites. This soil is well suited to dwellings and septic tank absorption fields. It is better suited to buildings without basements than to buildings with basements because of the depth to the bedrock, which is as shallow as 48 inches. Suitable fill material is needed on sites for septic tank absorption fields.

The land capability classification is IIe. The woodland ordination symbol is 4A.

SbC—Shelocta silt loam, 8 to 15 percent slopes. This deep, well drained, strongly sloping soil is on colluvial foot slopes and on side slopes. Areas are long and narrow or are irregularly shaped. They range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 45 inches of yellowish brown, friable silt loam, silty clay loam, and channery silt loam. The substratum to a depth of about 60 inches is yellowish brown, firm silty clay loam. In some areas the soil is moderately well drained. In a few areas the subsoil has more clay.

Included with this soil in mapping are small areas of Brownsville, Ernest, and Latham soils. Brownsville and Latham soils are on hillsides. Brownsville soils have a higher content of coarse fragments in the subsoil than the Shelocta soil. Latham soils are moderately well drained and are moderately deep over bedrock. Ernest soils have a fragipan. They are on foot slopes. Included soils make up about 10 percent of the unit.

Permeability and available water capacity are moderate in the Shelocta soil. Runoff is medium or rapid. The subsoil is very strongly acid or strongly acid.

This soil is moderately well suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include a high proportion of long-term hay or pasture. Erosion is a hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is moderately well suited to dwellings and septic tank absorption fields. It is better suited to buildings without basements than to buildings with basements because of the depth to bedrock, which is as shallow as 48 inches. The buildings should be designed so that they conform to the natural slope of the land. Suitable fill material is needed on sites for septic tank absorption fields. The distribution lines should be installed on the contour. Aeration sewage disposal systems are used in some areas. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

SbD—Shelocta silt loam, 15 to 25 percent slopes. This deep, well drained, moderately steep soil is on colluvial foot slopes and on side slopes. Areas are long and narrow or are irregularly shaped. They range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 4 inches thick. The subsoil is about 38 inches of yellowish brown, friable silt loam and channery silt loam. The substratum to a depth of about 60 inches is yellowish brown, firm silty clay loam. In some areas the soil is moderately well drained. In a few areas the subsoil and substratum have more clay.

Included with this soil in mapping are small areas of Brownsville soils on hillsides. These soils have a higher content of coarse fragments in the subsoil than the Shelocta soil. They make up about 15 percent of the unit.

Permeability and available water capacity are moderate in the Shelocta soil. Runoff is rapid. The subsoil is very strongly acid or strongly acid.

This soil is poorly suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include a high proportion of long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. This soil is poorly suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars also help to control erosion.

This soil is poorly suited to dwellings and septic tank absorption fields because of the slope and the depth of bedrock. Land shaping is needed in most areas. If the foot slopes are cut and filled, a retaining wall is needed to prevent downslope movement of the soil. A diversion is needed upslope from some buildings. Installing the distribution lines in septic tank absorption fields on the contour minimizes lateral seepage of effluent to the surface. An aeration sewage disposal system is used in some areas. Because of the hazard of erosion, as much vegetation as possible should be maintained on the site during construction. Local roads should be built across the slope.

The land capability classification is IVe. The woodland ordination symbol is 4R.

ScE—Shelocta-Brownsville association, steep. These deep, well drained soils are on side slopes and along entrenched drainageways in the uplands. The Shelocta soil is commonly on the mid and lower parts of the side slopes, and the Brownsville soil is on the upper and lower parts. Slopes are dominantly 25 to 40 percent. Areas are irregularly shaped and range from 100 to 1,500 acres in size. They generally are about 40 percent Shelocta silt loam and 40 percent Brownsville silt loam. Because of present and anticipated land uses, separating the two soils in mapping was not considered practical.

Typically, the Shelocta soil has a surface layer of dark yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 52 inches thick. The upper part is yellowish brown and strong brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown and brown, firm silty clay loam and channery silt loam. The substratum to a depth of about 60 inches is yellowish brown, friable very channery silt loam. In some areas the slope is less than 25 percent. In other areas the soil is moderately well drained. In some places the subsoil is thinner. In other places the subsoil and substratum have more clay.

Typically, the Brownsville soil has a surface layer of yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 40 inches thick. It is light yellowish brown. The upper part is friable silt loam, and the lower part is friable and firm extremely channery silt loam. The substratum to a depth of about 60 inches is light yellowish brown, firm extremely channery silt loam. In some areas the slope is more than 40 percent.

Included with these soils in mapping are areas of Berks, Ernest, and Latham soils. The moderately deep Berks soils are on the upper parts of the slopes. Ernest soils have a fragipan. They are on foot slopes. The moderately well drained, moderately deep Latham soils occur as narrow bands on hillsides. Also included are areas where sandstone and siltstone bedrock crops out on escarpments. Included areas are less then 20 acres in size. They make up about 20 percent of the association.

Permeability is moderate in the Shelocta soil and moderate or moderately rapid in the Brownsville soil. Available water capacity is moderate in the Shelocta soil and low or moderate in the Brownsville soil. Runoff is very rapid or rapid on both soils. The subsoil of the Shelocta soil is very strongly acid or strongly acid, and that of the Brownsville soil is strongly acid to extremely acid.

Most areas support native hardwoods. Some are used for pasture. Because of the slope and a severe hazard of erosion, these soils are generally unsuited to cultivated crops and to hay. They are poorly suited to pasture. The slope severely limits the use of equipment. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. No-till seeding helps to control erosion.

These soils are moderately well suited to trees. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Water bars and the use of cable logging equipment help to control erosion. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding log landings, skid trails, and logging roads after the trees are harvested also helps to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking.

Because of the slope, these soils are generally unsuitable as sites for dwellings and sanitary facilities. Developing sites for recreational and urban uses is very difficult. Cutting and filling increase the hazard of hillside slippage. Some areas are scenic and have potential as sites for hiking trails and lookout points. The hazard of erosion is severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible. Local roads should be built across the slope. Seeding and mulching roadbanks can minimize gullying.

The land capability classification is VIe. The woodland ordination symbol assigned to the Shelocta soil is 4R; that assigned to the Brownsville soil is 4R on north aspects, 3R on south aspects.

ScF—Shelocta-Brownsville association, very steep. These deep, well drained soils are on side slopes and along deeply entrenched drainageways in the uplands. The Shelocta soil is on the mid and lower parts of the side slopes, and the Brownsville soil is on the upper and lower parts. Slopes are dominantly 40 to 70 percent. Areas are irregularly shaped and range from 50 to 2,000 acres in size. They generally are about 40 percent Shelocta silt loam and 40 percent Brownsville silt loam. Because of present and anticipated land uses, separating the two soils in mapping was not considered practical.

Typically, the Shelocta soil has a surface layer of dark grayish brown and very dark grayish brown, friable silt loam about 6 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown, friable and firm silt loam, and the lower part is brown and yellowish brown, firm channery and very channery silt loam. The substratum to a depth of about 60 inches is yellowish brown, firm silty clay loam. In some areas on foot slopes, the slope is less than 40 percent. In some places the soil is moderately well drained. In other places the subsoil has more clay. In a few areas it is thinner.

Typically, the Brownsville soil has a surface layer of yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 40 inches thick. It is light yellowish brown. The upper part is friable channery and very channery silt loam, and the lower part is friable and firm extremely channery silt loam. The substratum to a depth of about 60 inches is light yellowish brown, firm extremely channery silt loam. In some areas the slope is more than 70 percent.

Included with these soils in mapping are areas of Berks, Ernest, and Latham soils. The moderately deep Berks soils are on the upper parts of the slopes. Ernest soils have a fragipan. They are on foot slopes. The moderately well drained, moderately deep Latham soils are on the lower parts of the side slopes and on ridgetops. Also included are areas where sandstone and siltstone bedrock is exposed on steep escarpments. Included areas are less than 20 acres in size. They make up about 20 percent of the association.

Permeability is moderate in the Shelocta soil and moderate or moderately rapid in the Brownsville soil. Available water capacity is moderate in the Shelocta soil and low or moderate in the Brownsville soil. Runoff is very rapid on both soils. The subsoil of the Shelocta soil is very strongly acid or strongly acid, and that of the Brownsville soil is strongly acid to extremely acid.

Most areas support native hardwoods (fig. 9). Because of the slope and a severe hazard of erosion, these soils are generally unsuited to cultivated crops, hay, and pasture. They are moderately well suited to trees. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Water bars help to control erosion in some areas. Seeding log landings, skid trails, and logging roads after the trees are harvested also helps to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking.

Because of the slope, these soils are generally unsuitable as sites for dwellings and sanitary facilities. Developing sites for recreational and urban uses is very difficult. Cutting and filling increase the hazard of hillside slippage. Some areas are scenic and have potential as sites for hiking trails and lookout points. The hazard of erosion is severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible. Local roads should be built across the slope. Seeding and mulching roadbanks can minimize gullying.

The land capability classification is VIIe. The woodland ordination symbol assigned to the Shelocta soil is 4R; that assigned to the Brownsville soil is 4R on north aspects, 3R on south aspects.

SeF—Shelocta-Steinsburg association, very steep. These well drained soils are on shoulder slopes and side slopes in the uplands. The deep Shelocta soil is on the mid and lower parts of the side slopes. The moderately deep Steinsburg soil is on the upper parts of the side slopes and on shoulder slopes. Slopes are dominantly 40 to 60 percent. Areas are irregularly shaped and range from 150 to 400 acres in size. They generally are about

Figure 9.—A wooded area of the Shelocta-Brownsville association, very steep.

50 percent Shelocta silt loam and 35 percent Steinsburg sandy loam. Because of present and anticipated land

uses, separating the two soils in mapping was not considered practical or necessary.

Typically, the Shelocta soil has a surface layer of very dark grayish brown and dark yellowish brown, friable silt loam about 6 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 43 inches thick. The upper part is brown and yellowish brown, friable and firm silt loam, and the lower part is yellowish brown and brown, firm channery and very channery silt loam. The substratum to a depth of about 60 inches is yellowish brown, firm silty clay loam. In some areas the slope is less than 40 percent. In a few places the soil is moderately well drained. In places the subsoil has more sand or more clay. In a few areas it is thinner.

Typically, the Steinsburg soil has a surface layer of very dark grayish brown, friable sandy loam about 5 inches thick. The subsoil is about 23 inches of light yellowish brown and brown, friable sandy loam and channery sandy loam. Weakly cemented, medium and coarse grained sandstone bedrock is at a depth of about 28 inches. In some areas the soil is shallow over bedrock. In a few areas the subsoil has a higher content of coarse fragments. In a few places the slope is more than 60 percent.

Included with these soils in mapping are areas of Ernest and Latham soils. Ernest soils have a fragipan. They are on foot slopes. Latham soils are moderately well drained and are on side slopes. Included areas are less than 20 acres in size. They make up about 15 percent of the association.

Permeability is moderate in the Shelocta soil and moderately rapid in the Steinsburg soil. Available water capacity is moderate in the Shelocta soil and low or very low in the Steinsburg soil. Runoff is very rapid on both soils. The subsoil of the Shelocta soil is very strongly acid or strongly acid, and that of the Steinsburg soil typically is strongly acid.

Most areas support native hardwoods. Because of the slope and a severe hazard of erosion, these soils are generally unsuited to cultivated crops. They are moderately well suited to trees. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding log landings, skid trails, and logging roads after the trees are harvested and establishing water bars also help to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking.

Because of the slope of both soils and the bedrock at a depth of 24 to 40 inches in the Steinsburg soil, these soils are generally unsuitable as sites for dwellings and septic tank absorption fields. Developing sites for recreational and urban uses is very difficult. Some areas are scenic and have potential as sites for hiking trails and lookout points. The hazard of erosion is severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible. Seeding and mulching roadbanks can minimize gullying.

The land capability classification is VIIe. The woodland ordination symbol assigned to the Shelocta soil is 4R; that assigned to the Steinsburg soil is 4R on north aspects, 3R on south aspects.

SfE—Shelocta-Wharton-Latham association, steep. These soils are on hillsides and foot slopes in the uplands. The deep, well drained Shelocta soil is on the steeper parts of side slopes. The deep, moderately well drained Wharton soil is on the less sloping parts of the hillsides and on foot slopes. The moderately deep, moderately well drained Latham soil commonly occurs as strips on the hillsides. Slopes are dominantly 25 to 40 percent. Areas are irregularly shaped and range from 100 to 2,000 acres in size. They generally are 45 percent Shelocta silt loam, 30 percent Wharton silt loam, and 10 percent Latham silt loam. Because of present and anticipated land uses, separating the three soils in mapping was not considered practical.

Typically, the Shelocta soil has a surface layer of dark grayish brown and very dark grayish brown, friable silt loam about 6 inches thick. The subsoil is about 45 inches thick. It is yellowish brown and brown. The upper part is friable and firm silt loam, and the lower part is firm channery silt loam. The substratum to a depth of about 68 inches is yellowish brown, firm silty clay loam. In places the subsoil is thinner. In a few areas it has more clay.

Typically, the Wharton soil has a surface layer of brown, friable silt loam about 5 inches thick. The upper part of the subsoil is yellowish brown, firm silt loam and friable channery silt loam. The lower part to a depth of about 60 inches is yellowish brown and strong brown, mottled, friable and firm silty clay loam. In a few areas the subsoil has less sand. In places the soil has a fragipan.

Typically, the Latham soil has a surface layer of dark brown, friable silt loam about 3 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is light brown and strong brown, mottled, firm silty clay loam. Light brown, weathered shale bedrock is at a depth of about 33 inches. In places the subsoil is redder.

Included with these soils in mapping are areas of Berks and Brownsville soils. These included soils have a higher content of coarse fragments in the subsoil than the Shelocta, Wharton, and Latham soils. Berks soils are on ridgetops, and Brownsville soils are on hillsides. Included areas are less than 20 acres in size. They make up about 15 percent of the association.

Permeability is moderate in the Shelocta soil, moderately slow or slow in the Wharton soil, and slow in the Latham soil. Available water capacity is moderate in the Shelocta and Wharton soils and low in the Latham soil. Runoff is very rapid on all three soils. The shrink-swell potential is low in the Shelocta soil, moderate in the Wharton soil, and high in the Latham soil. The subsoil of Shelocta and Latham soils is very strongly acid or strongly acid, and that of the Wharton soil is medium acid to very strongly acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet in the Latham and Wharton soils during extended wet periods.

Some areas are used as pasture. Because of the slope and a severe hazard of erosion, these soils are generally unsuited to cultivated crops and to hay. They are poorly suited to pasture. The slope severely limits the use of equipment. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. No-till seeding helps to control erosion.

Most areas support native hardwoods. These soils are moderately well suited to trees. Coves and north- and east- facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Plant competition on the Wharton soil can be controlled by spraying, cutting, or girdling. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding log landings, skid trails, and logging roads after the trees are harvested and establishing water bars also help to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Seedling losses can be offset by overstocking. The windthrow hazard on the Latham soil can be reduced by harvesting techniques that do not isolate the remaining trees or leave them widely spaced.

Because of the slope, these soils are generally unsuitable as sites for dwellings and septic tank absorption fields. Developing sites for recreational and urban uses is very difficult. Cutting and filling increase the hazard of hillside slippage. Some areas are scenic and have potential as sites for hiking trails and lookout points. The hazard of erosion is severe if the plant cover is removed. Trails in recreational areas should be protected against erosion and should be laid out across the slope if possible. Local roads should be built across the slope. Seeding and mulching roadbanks can minimize erosion.

The land capability classification is VIe. The woodland ordination symbol assigned to the Shelocta and Wharton soils is 4R; that assigned to the Latham soil is 4R on north aspects, 3R on south aspects.

Sk—Skidmore silt loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains along small streams. Slope ranges from 0 to 3 percent. Most areas are long and narrow and range from 20 to 150 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 19 inches of yellowish brown, friable gravelly loam and extremely gravelly loam. The substratum to a depth of about 60 inches is yellowish brown, firm very gravelly loam. In some areas the slope is more than 3 percent. In places the surface layer is gravelly loam.

Included with this soil in mapping are small areas of Haymond and Shelocta soils. These soils have fewer coarse fragments between depths of 10 and 40 inches than the Skidmore soil. Shelocta soils are on fans. Haymond soils are in landscape positions similar to those of the Skidmore soil. Included soils make up about 15 percent of the unit.

Permeability is moderately rapid in the Skidmore soil. Available water capacity is low. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil typically is medium acid. A seasonal high water table is at a depth of 3 to 4 feet during extended wet periods.

Some areas are used as cropland. This soil is well suited to corn, tobacco, soybeans, and small grain. The major hazards are flooding and drought. Flooding during winter and spring can damage small grain. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the available water capacity. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

Most areas are pastured. This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the flooding and the wetness, this soil is generally unsuited to dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 4A.

St—Stendal silt loam, occasionally flooded. This deep, somewhat poorly drained, nearly level soil is on flood plains. Slope is 0 to 2 percent. Most areas are circular or are long and narrow. They range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown, mottled, friable silt loam about 6 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, gray, grayish brown, yellowish brown, and olive brown, mottled, friable silt loam. In some areas the soil is moderately well drained or poorly drained. In a few areas it has a higher content of sand and coarse fragments.

Included with this soil in mapping are small areas of the well drained Cuba, Haymond, and Tioga soils. Cuba soils are on slight rises and near streams. Haymond and Tioga soils are on natural levees adjacent to the streams. Included soils make up about 5 percent of the unit.

Permeability is moderate in the Stendal soil, and available water capacity is high. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The substratum is strongly acid or medium acid. A seasonal high water table is at a depth of 1 to 3 feet during extended wet periods.

Most areas are used as cropland. Drained areas of this soil are well suited to corn and soybeans and moderately well suited to small grain. Undrained areas are moderately well suited or poorly suited to row crops. The seasonal wetness and the flooding are the major management concerns. Surface or subsurface drains can remove excess water in areas where adequate outlets are available. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

Drained areas are well suited to grasses and legumes for hay and pasture, but undrained areas are only moderately well suited because of the seasonal wetness and the flooding. This soil is poorly suited to grazing early in spring. Surface and subsurface drains can remove excess water in areas where adequate outlets are available. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted grazing during wet periods help to keep the pasture in good condition. When new stands are established, the species that can withstand the wetness should be selected for planting.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is generally unsuited to dwellings and septic tank absorption fields because of the flooding and the seasonal wetness.

The land capability classification is IIw. The woodland ordination symbol is 5A.

TcB—Tilsit-Coolville association, undulating. These deep, moderately well drained soils are on ridgetops. The Tilsit soil is on the less sloping parts of the ridgetops, and the Coolville soil is on the more sloping parts. Slopes are dominantly 3 to 8 percent. Most areas are long and are 150 to 600 feet wide. They range from 10 to 150 acres in size. They are about 60 percent Tilsit silt loam and 25 percent Coolville silt loam. Because of present and anticipated land uses, separating the two soils in mapping was not considered practical or necessary.

Typically, the Tilsit soil has a surface layer of brown, friable silt loam about 8 inches thick. The subsoil is about 52 inches thick. It is mottled below a depth of about 19 inches. It is brown, yellowish brown, and light yellowish brown, friable and firm silt loam in the upper part; a fragipan of yellowish brown and brown, very firm, brittle silt loam and silty clay loam in the next part; and strong brown, firm silty clay loam in the lower part. In some areas the soil does not have a fragipan.

Typically, the Coolville soil has a surface layer of brown, friable silt loam about 8 inches thick. The subsoil is about 37 inches thick. The upper part is strong brown, friable silt loam; the next part is brown, mottled, firm silty clay; and the lower part is yellowish red and strong brown, mottled, firm silty clay and brown, firm silty clay loam. Soft shale bedrock is at a depth of about 45 inches. In some areas the soil is moderately deep over bedrock. In other areas it has a mantle of silt less than 14 inches thick.

Included with these soils in mapping are areas of Berks, Gilpin, and Latham soils. Berks soils have a higher content of coarse fragments in the subsoil than the Tilsit and Coolville soils. They are commonly on ridgetops less than 80 feet wide. Gilpin and Latham soils are moderately deep. They are on shoulder slopes. Included areas are less than 10 acres in size. They make up about 15 percent of the association.

Permeability is moderate above the fragipan in the Tilsit soil and slow in the fragipan. It is moderate in the upper part of the Coolville soil and slow or very slow in the lower part. The root zone of the Tilsit soil is restricted mainly to the 22 to 28 inches above the fragipan. Available water capacity is moderate in both soils. Runoff is medium. The subsoil of the Tilsit soil is very strongly acid or strongly acid, and that of the Coolville soil is extremely acid to strongly acid. Both soils have a perched seasonal high water table in the lower part of the subsoil during extended wet periods.

Most of the acreage is farmed. These soils are well suited to corn, soybeans, tobacco (fig. 10), and small grain. If the soils are cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

These soils are well suited to hay and pasture. Overgrazing or grazing when the soils are wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. These soils are well suited to trees. No major hazards or limitations affect planting or harvesting.

These soils are poorly suited to septic tank absorption fields because the seasonal wetness and the slow or very slow permeability are severe limitations. The effects of these limitations can be minimized by increasing the size of the absorption area and by installing an aeration system. Perimeter drains around the absorption field reduce the wetness.

These soils are moderately well suited to dwellings and local roads. Because of the seasonal wetness, they are better suited to houses without basements than to houses with basements. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Properly landscaping building sites helps to keep surface water away from foundations. Backfilling along foundations with material that has a low shrink-swell potential minimizes the damage caused by shrinking and swelling of the Coolville soil. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site.

Figure 10.—Tobacco in an area of the Tilsit-Coolville association, undulating.

The land capability classification is IIe. The woodland ordination symbol is 4A.

To—Tioga loam, occasionally flooded. This deep, well drained, nearly level soil is on flood plains. Slope ranges from 0 to 3 percent. Most areas are circular or are long and narrow. They range from 5 to 40 acres in size.

Typically, the surface layer is brown, friable loam about 13 inches thick. The subsoil is yellowish brown, very friable fine sandy loam about 11 inches thick. The substratum to a depth of about 77 inches is yellowish brown, loose loamy fine sand and very friable fine sandy loam. In some areas the subsoil has more clay or less sand. In a few areas it is more acid.

Included with this soil in mapping are small areas of Cuba and Stendal soils. Cuba soils have more silt in the subsoil than the Tioga soil. They are in landscape positions similar to those of the Tioga soil. The somewhat poorly drained Stendal soils are in small depressions along streams. Included soils make up about 10 percent of the unit.

Permeability is moderate or moderately rapid in the subsoil of the Tioga soil and rapid in the substratum. Available water capacity is moderate. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil is medium acid to neutral. A seasonal high water table is at a depth of 3 to 6 feet during extended wet periods.

Most areas are used as cropland. A few areas are used for strawberries (fig. 11). This soil is well suited to corn and soybeans. Small grain, such as winter wheat, can be damaged by flooding during winter and spring. Planting is delayed in some years because of flooding in spring. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the available water capacity. Tilling within the optimum moisture range minimizes compaction, helps to maintain soil structure, and improves tilth.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction, increases the runoff rate, and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition can be controlled by spraying, cutting, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is well suited to picnic areas and to paths and trails. It is only moderately well suited to camp areas and playgrounds because of the flooding.

The land capability classification is IIw. The woodland ordination symbol is 4A.

WeA—Weinbach silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained, nearly level soil is on terraces. Most areas are long and broad or are irregularly shaped. They range from 5 to 80 acres in size.

Typically, the surface layer is dark grayish brown, mottled, friable silt loam about 10 inches thick. The upper part of the subsoil is brown, mottled, friable silty clay loam. The next part is a fragipan of strong brown, mottled, very firm, brittle silty clay loam. The lower part to a depth of about 70 inches is dark brown, mottled, friable silt loam. In some areas the soil is deeper to the top of the fragipan. In a few areas it does not have a fragipan.

Included with this soil in mapping are small areas of the moderately well drained Sciotoville soils on slight rises. Also included are areas that are subject to rare flooding. Included soils make up about 5 percent of the unit.

Permeability is moderate above the fragipan in the Weinbach soil and very slow in the fragipan. The root zone is restricted mainly to the 24 to 36 inches above the fragipan. This zone has a low or moderate available water capacity. Runoff is slow. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The part of the subsoil above the fragipan commonly is strongly acid. A perched seasonal high water table is at a depth of 1 to 3 feet during extended wet periods.

Most areas are used as cropland. This soil is well suited to corn, soybeans, and small grain. The seasonal wetness and the dense, very slowly permeable fragipan are the major limitations. Surface and subsurface drains can remove excess water in areas where adequate outlets are available. Subsurface drains are more effective if they are installed on or above the very slowly permeable fragipan. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration. Tilling within the optimum moisture range minimizes compaction, maintains soil structure, and improves tilth.

Drained areas of this soil are well suited to grasses and legumes for hay and pasture but are poorly suited to grazing early in spring. Surface and subsurface drains can remove excess water in areas where adequate outlets are available. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted grazing during wet periods help to keep the pasture in good condition. The species that can withstand the wetness should be selected for planting.

This soil is moderately well suited to trees. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Harvesting techniques that do not isolate the remaining trees or leave them widely spaced and a border of conifers along the edge of the woodland reduce the windthrow hazard.

Figure 11.—Strawberries on Tioga loam, occasionally flooded.

This soil is poorly suited to septic tank absorption fields because of the seasonal wetness and the very slow permeability. Increasing the size of the absorption field helps to overcome the restricted permeability. Perimeter drains around the absorption field reduce the wetness. Aeration systems can be used.

Because of the seasonal wetness, low strength, and frost action, this soil is poorly suited to dwellings and local roads. It is better suited to houses without basements than to houses with basements because of the wetness. Properly landscaping building sites helps to keep surface water away from foundations. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by frost action and low strength. The included areas that are subject to rare flooding are generally unsuitable as sites for buildings.

The land capability classification is IIw. The woodland ordination symbol is 4D.

WfD—Wharton silt loam, 15 to 25 percent slopes. This deep, moderately well drained, moderately steep soil is on foot slopes and hillsides. Most areas are long and narrow. They range from 5 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 39 inches thick. The upper part is strong brown and yellowish brown, firm silt loam and silty clay loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, firm silty clay loam. In some areas the soil is well drained. In a few areas it is moderately deep over bedrock.

Included with this soil in mapping are small areas of the moderately well drained Ernest and Latham soils. Ernest soils have a fragipan. They are on foot slopes. The moderately deep Latham soils have more clay in the subsoil than the Wharton soil. They are in landscape positions similar to those of the Wharton soil. Included soils make up about 15 percent of the unit.

Permeability is moderately slow or slow in the Wharton soil. Available water capacity is moderate. Runoff is rapid. The shrink-swell potential is moderate. The subsoil is very strongly acid to medium acid. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Some areas are used as cropland. This soil is poorly suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture (fig. 12). This soil is poorly suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded. Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

Most areas support native hardwoods. This soil is moderately well suited to trees. Coves and north- and east-facing slopes are the best sites for woodland. These sites have more available water and cooler temperatures because of less exposure to direct sunlight and to the prevailing wind. Locating skid trails and logging roads on or nearly on the contour helps to control erosion and facilitates the use of equipment. Seeding log landings, skid trails, and logging roads after the trees are harvested also helps to control erosion. Filter strips or undisturbed buffer strips between the harvested area and watercourses minimize the siltation of streams. Planting seedlings that have been transplanted once reduces the seedling mortality rate on south-facing slopes. Seedling losses can be offset by overstocking.

Because of the moderately slow or slow permeability, the seasonal wetness, and the slope, this soil is poorly suited to septic tank absorption fields. Enlarging the absorption area helps to overcome the restricted permeability. The distribution lines should be installed on the contour. Installing interceptor drains upslope from the absorption field reduces the wetness. An aeration sewage disposal system is used in some areas.

This soil is poorly suited to dwellings because of the slope and the seasonal wetness. Land shaping is needed in most areas. In areas that are cut and filled, a retaining wall is commonly needed to prevent the downslope movement of the soil above the building site. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by low strength and frost action.

The land capability classification is IVe. The woodland ordination symbol is 4R.

WkD—Wharton-Urban land complex, 8 to 20 percent slopes. This map unit occurs as areas of a deep, moderately well drained, strongly sloping and moderately steep Wharton soil intermingled with areas of Urban land. The unit is on foot slopes and the lower parts of side slopes (fig. 13). Areas are irregularly shaped and range from 10 to 400 acres in size. Most are about 60 percent Wharton silt loam and 30 percent Urban land. The Wharton soil and the Urban land occur as areas so intricately mixed or so small that separating them in mapping is not practical.

Typically, the Wharton soil has a surface layer of dark brown, friable silt loam about 5 inches thick. The upper part of the subsoil is yellowish brown, firm silt loam and friable channery silt loam. The lower part to a depth of about 60 inches is yellowish brown and strong brown, mottled, friable silt loam and firm silty clay loam. In places the soil is well drained. Some low areas have been filled or leveled during construction, and other small areas have been cut, built up, or smoothed.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not feasible.

Included in this unit in mapping are small areas of Brownsville, Ernest, Omulga, and Monongahela soils. Brownsville soils have a higher content of coarse

Figure 12.—A pastured area of Wharton silt loam, 15 to 25 percent slopes.

fragments in the subsoil than the Wharton soil. They are on side slopes. Ernest, Omulga, and Monongahela soils have a fragipan. Ernest soils are on foot slopes. Omulga and Monongahela soils are in preglacial valleys. Included soils make up about 10 percent of the unit.

Most heavily developed areas are drained by sewer systems, gutters, and subsurface drains and, to a lesser extent, by open ditches. In undrained areas the Wharton soil has a perched seasonal high water table at a depth of 1.5 and 3.0 feet during extended wet periods. Permeability is moderately slow or slow in this soil. Available water capacity is moderate. Runoff is medium or rapid. The subsoil is very strongly acid to medium acid.

The Wharton soil is used for lawns, gardens, and parks. It is moderately well suited to trees and shrubs. It is poorly suited to lawns and to vegetable and flower gardens. The lawns and gardens can be improved by additions of lime, fertilizer, mulch, and organic matter. The surface layer crusts after heavy rains. Unless a blanket of topsoil is added, establishing vegetation is difficult in the areas that have been cut and filled.

Because of the seasonal wetness and the restricted permeability, the Wharton soil is poorly suited to septic tank absorption fields. Most sanitary facilities in heavily developed areas are connected to sewers and sewage treatment facilities. Aeration sewage disposal systems are used in some areas.

The Wharton soil is poorly suited to dwellings because of the slope and the seasonal wetness. Land shaping is needed in most areas. If a toe slope is cut and filled, a retaining wall is commonly needed to prevent the downslope movement of the soil above the building site. Installing interceptor drains upslope from the buildings reduces the seasonal wetness. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by low strength and frost action.

The Wharton soil is in land capability classification IVe. It is not assigned a woodland ordination symbol. The Urban land is not assigned a land capability classification or a woodland ordination symbol.

WmB—Wheeling silt loam, 1 to 8 percent slopes. This deep, well drained, gently sloping soil is on terraces. Areas generally are long and narrow or are irregularly shaped. They range from 5 to 40 acres in size.

Figure 13.—An area of Wharton-Urban land complex, 8 to 20 percent slopes.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 44 inches of yellowish brown, dark yellowish brown, and dark brown, firm and friable silt loam, loam, and fine sandy loam. The substratum to a depth of about 60 inches is dark yellowish brown, loose fine sand. In some areas it has more clay. In places the subsoil has less sand.

Included with this soil in mapping are narrow strips of the moderately well drained Sciotoville and somewhat poorly drained Weinbach soils. Sciotoville soils are in the slightly lower areas. Weinbach soils are along drainageways. Also included are areas that are subject to rare flooding. Included soils make up about 10 percent of the unit.

Permeability is moderate in the subsoil of the Wheeling soil and rapid in the substratum. Available water capacity is moderate. Runoff is slow or medium. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil typically is strongly acid or medium acid.

Most of the acreage is farmed. This soil is well suited to corn, soybeans, tobacco, and small grain. If the soil is cultivated, erosion is a hazard. Cultivated crops can be grown year after year if erosion is controlled and improved management is applied. Measures that maintain tilth and the organic matter content are needed. A system of conservation tillage that leaves crop residue on the surface, a cropping sequence that includes grasses and legumes, incorporation of crop residue into the plow layer, contour farming or contour stripcropping, and grassed waterways help to maintain tilth and reduce the runoff rate and the hazard of erosion. Tilling within the optimum moisture range minimizes compaction.

This soil is well suited to hay and pasture. Pastured areas can be grazed early in spring. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition can be controlled by spraying, cutting, or girdling.

This soil is well suited to dwellings and septic tank absorption fields. Because of the rapid permeability, however, the substratum does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Installing the absorption field in suitable fill material reduces this hazard. An aeration system also reduces this hazard. Providing suitable base material minimizes the damage to local roads and streets caused by frost action and low strength. The included areas that are subject to rare flooding are generally unsuitable for building site development.

The land capability classification is IIe. The woodland ordination symbol is 4A.

WpB—Wheeling-Urban land complex, 1 to 8 percent slopes. This map unit occurs as areas of a deep, well drained, gently sloping Wheeling soil intermingled with areas of Urban land. The unit is on terraces. Areas range from 30 to 1,000 acres in size. They are long and narrow or are irregularly shaped. Most are about 50 percent Wheeling silt loam and 35 percent Urban land. The Wheeling soil and the Urban land occur as areas so intricately mixed or so small that separating them in mapping is not practical.

Typically, the Wheeling soil has a surface layer of brown, friable silt loam about 9 inches thick. The subsurface layer is brown, friable loam about 4 inches thick. The subsoil is also brown, friable loam. It is about 43 inches thick. The substratum to a depth of about 79 inches is dark yellowish brown, loose fine sand. In some areas it has more clay. A few low areas have been filled or leveled during construction, and other small areas have been cut, built up, or smoothed. In places the subsoil has less sand.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not feasible.

Included in this unit in mapping are narrow strips of the moderately well drained Sciotoville soils on the slightly lower parts of the landscape and narrow areas of the somewhat poorly drained Weinbach soils along drainageways. Also included are areas that are subject to rare flooding. Included soils make up about 15 percent of the unit.

Permeability is moderate in the subsoil of the Wheeling soil and rapid in the substratum. Available water capacity is moderate. Runoff is slow or medium. The surface layer can be easily tilled throughout a fairly wide range in moisture content. The subsoil typically is strongly acid or medium acid.

The Wheeling soil is used for lawns, gardens, and parks. It is well suited to lawns, trees, shrubs, and vegetable and flower gardens. The lawns and gardens can be improved by additions of lime, fertilizer, mulch, and organic matter. The surface layer crusts after heavy rains. Unless a blanket of topsoil is added, establishing vegetation is difficult in the included areas that have been cut and filled.

The Wheeling soil is well suited to dwellings and septic tank absorption fields. Because of the rapid permeability, however, the substratum does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Sanitary facilities should be connected to central sewer and treatment facilities wherever possible. Providing suitable base material under local roads and streets minimizes the road damage caused by frost action and low strength. The included areas that are subject to rare flooding are generally unsuitable for building site development.

The Wheeling soil is in land capability classification IIe. It is not assigned a woodland ordination symbol. The Urban land is not assigned a land capability classification or a woodland ordination symbol.

WyB—Wyatt silt loam, 1 to 8 percent slopes. This deep, moderately well drained, gently sloping soil is in preglacial valleys. Most areas are wide and broad or are irregularly shaped. They range from 5 to 120 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 49 inches thick. It is yellowish brown. The upper part is friable silty clay loam and firm silty clay, and the lower part is mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is brown, very firm clay. In some areas the subsoil has less clay.

Included with this soil in mapping are small areas of Doles, Omulga, and Monongahela soils. These soils have a fragipan. The somewhat poorly drained Doles soils are in the lower areas. Omulga and Monongahela soils contain less clay in the subsoil than the Wyatt soil. They are in landscape positions similar to those of the Wyatt soil. Included soils make up about 10 percent of the unit.

Permeability is slow or very slow in the Wyatt soil. Available water capacity is moderate. Runoff is medium. The shrink-swell potential is high. The subsoil is very strongly acid to medium acid in the upper part and medium acid to neutral in the lower part. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Most areas are used as cropland or pasture. This soil is moderately well suited to corn, soybeans, and small grain. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

This soil is well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Proper stocking rates, pasture rotation, mowing for weed control, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

This soil is moderately well suited to trees. Harvesting techniques that do not isolate the remaining trees or leave them widely spaced and a border of conifers along the edge of the woodland reduce the windthrow hazard. Planting seedlings that have been transplanted once reduces the seedling mortality rate.

Because of the restricted permeability and the seasonal wetness, this soil is poorly suited to septic tank absorption fields. The effects of these limitations can be minimized by increasing the size of the absorption area or by installing an aeration system.

This soil is poorly suited to dwellings. Because of the seasonal wetness, it is better suited to houses without basements than to houses with basements. Properly designing foundations and footings and backfilling excavations around walls and foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads and streets caused by low strength, frost action, and shrinking and swelling.

The land capability classification is IIIe. The woodland ordination symbol is 4C.

WyC2—Wyatt silt loam, 8 to 15 percent slopes, eroded. This deep, moderately well drained, strongly sloping soil is in preglacial valleys. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and subsoil material. Most areas are circular or are long and narrow. They range from 5 to 20 acres in size.

Typically, the surface layer is yellowish brown, firm silt loam about 5 inches thick. The subsoil is about 31 inches thick. It is brown, firm silty clay loam in the upper part and yellowish brown, mottled, firm silty clay in the lower part. The substratum to a depth of about 80 inches is brown, very firm clay and silty clay. In some areas the subsoil has less clay.

Included with this soil in mapping are small areas of Monongahela soils. These soils have a fragipan. They are in landscape positions similar to those of the Wyatt soil. They make up about 10 percent of the unit.

Permeability is slow or very slow in the Wyatt soil. Available water capacity is moderate. Runoff is rapid. The shrink-swell potential is high. The subsoil is very strongly acid to medium acid in the upper part and medium acid to neutral in the lower part. A perched seasonal high water table is at a depth of 1.5 to 3.0 feet during extended wet periods.

Some areas are used as cropland. This soil is poorly suited to corn, soybeans, and small grain. It can be cropped successfully, but the cropping sequence should include long-term hay or pasture. Erosion is a serious hazard, especially if the slopes are long. Applying a system of conservation tillage that leaves crop residue on the surface, growing cover crops, tilling at the proper moisture content, and establishing grassed waterways help to control erosion, improve tilth, and maintain the organic matter content.

Many areas are used as hayland and pasture. This soil is moderately well suited to hay and pasture. Overgrazing or grazing when the soil is wet causes compaction and excessive runoff and reduces forage yields. Cover crops, companion crops, and no-till seeding help to control erosion when the pasture is seeded.

Proper stocking rates, pasture rotation, and timely applications of lime and fertilizer help to maintain a good stand of the key forage species.

This soil is moderately well suited to trees. The windthrow hazard can be reduced by harvesting techniques that do not isolate the remaining trees or leave them widely spaced and by a border of conifers along the edge of the woodland. Planting seedlings that have been transplanted once reduces the seedling mortality rate.

Because of the restricted permeability and the seasonal wetness, this soil is poorly suited to septic tank absorption fields. The effects of these limitations can be minimized by enlarging the absorption area or by installing an aeration system. Installing the distribution lines across the slope minimizes the seepage of effluent to the surface.

This soil is poorly suited to dwellings. It is better suited to houses without basements than to houses with basements because of the seasonal wetness. Properly designing foundations and footings and backfilling excavations around walls and foundations with material that has a low shrink-swell potential help to prevent the structural damage caused by shrinking and swelling. Installing drains at the base of footings and coating the exterior of basement walls help to keep basements dry. The buildings should be designed so that they conform to the natural slope of the land. Because of the erosion hazard, as much vegetation as possible should be maintained on the construction site. Installing a roadside drainage system and providing suitable base material minimize the damage to local roads caused by low strength, frost action, and shrinking and swelling.

The land capability classification is IVe. The woodland ordination symbol is 4C.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 69,600 acres in the survey area, or nearly 18 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the valleys, mainly in associations 5 to 10, which are described under the heading "General Soil Map Units." Most of this prime farmland is used for crops, mainly corn and soybeans.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses (fig. 14). The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table qualify for prime farmland only in areas where this limitation has been overcome by drainage measures. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not this limitation has been overcome by corrective measures.

Figure 14.—Urban development encroaching onto prime farmland in an area of Omulga silt loam, 1 to 8 percent slopes.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

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

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

The soils in the survey area are assigned to various interpretive groups at the end of each map unit description. The groups for each map unit also are shown in the section "Interpretive Groups," which follows the tables at the back of this survey.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1981, about 25,800 acres in Scioto County was used for row crops, mainly corn and soybeans; 11,800 acres for hay; 2,000 acres for close-growing crops, mainly wheat; and 400 acres for tobacco (*7*). In 1979, about 31,581 acres was pastured (*22*).

The potential for increased food production is good in the county. This production can be increased by extending the latest crop production technology to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology. The major management needs on the cropland in the county are measures that control erosion, drainage or irrigation systems, flood control, and measures that improve or help to maintain fertility and tilth.

Erosion is a hazard on all of the gently sloping to very steep soils in the county. It reduces soil productivity and results in deterioration of tilth. It also increases the amount of sediment, herbicides, and pesticides that enter waterways and streams. The hazard of erosion increases as the percentage of slope increases. In eroded spots preparing a seedbed and tilling are difficult because part of the original friable surface layer has been removed by erosion. Such spots are common in areas of the eroded Monongahela and Wyatt soils.

A protective plant cover increases the rate of water infiltration and reduces the runoff rate and the hazard of erosion. Keeping a plant cover on the soil for extended periods can hold soil losses to an amount that will not reduce the productivity of the soil. Including grasses and legumes in the cropping sequence reduces the risk of erosion, increases the supply of nitrogen, and improves tilth.

Soil loss also can be reduced by tillage methods that leave all of the crop residue on the surface throughout the year or incorporate part of the residue into the soil. If these methods are applied, a high level of management is needed to control weeds and insects. These methods are best suited to well drained and moderately well drained soils. A drainage system is needed if no-till farming or another system of conservation tillage that leaves crop residue on the surface is applied on somewhat poorly drained to very poorly drained soils.

Other erosion-control measures include grassed waterways, contour farming or contour stripcropping, and diversions. Grassed waterways are natural or constructed surface drains protected by a cover of grasses. Natural drainageways are the best sites for these waterways because they commonly require a minimum of shaping. The waterways should be wide and flat, so that they can be easily crossed by farm machinery. Contour farming and contour stripcropping are used in areas of soils on foot slopes, such as some areas of Shelocta and Wharton soils, and in the steeper areas of Omulga and Wyatt soils. Diversions reduce the length of slopes and thus help to control runoff and erosion. They are most practical on deep, well drained soils that have smooth slopes.

Information about the design of erosion-control practices for each kind of soil is available in the local office of the Soil Conservation Service.

Soil drainage is a major management problem if Doles, Fitchville, Peoga, Piopolis, Stendal, or Weinbach soils are used as cropland. Some soils are naturally so wet that production of the crops commonly grown in the county generally is not possible unless a drainage system is installed. Surface and subsurface drains can improve drainage in many areas. Finding adequate outlets for subsurface drainage systems is difficult, however, in many areas of Peoga and Piopolis soils.

Protection from *flooding* is needed on Cuba, Genesee, Haymond, Tioga, and other soils on flood plains. In some areas levees protect these soils from streambank overflow.

Irrigation systems are not extensive in Scioto County because the amount of rainfall is adequate for crop production in most areas. Sprinkler irrigation is used in areas where vegetables and berries that have a high value per acre are grown. Many of the soils in the county are suitable for irrigation. Examples are Nolin, Rossburg, Landes, Genesee, and Haymond soils. Generally, these soils absorb water readily, have an adequate available water capacity, are well drained, and are nearly level or gently sloping.

Soil fertility is naturally low or medium in many of the soils on uplands in the county. The soils on the flood plains along the Scioto River and Scioto Brush Creek, such as Genesee, Landes, Huntington, Nolin, and Rossburg soils, are slightly acid to moderately alkaline in the root zone. These soils are naturally higher in content of plant nutrients than most of the soils on uplands. The soils on the flood plains formed in alluvium washed in from areas of limestone or of glacial till that has a high content of lime.

Many of the soils on uplands are naturally acid in the surface layer. Applications of ground limestone are needed to raise the pH level sufficiently for good production of alfalfa and other crops that grow well on nearly neutral soils. The supply of available phosphorus and potassium is naturally low in most of these soils. On all soils additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. Assistance in determining the kinds and amounts of lime and fertilizer to be applied can be obtained from the Cooperative Extension Service.

Soil tilth is an important factor affecting the germination of seeds and the infiltration of water into the soil. Soils with good tilth are friable and porous.

Most of the soils used for crops in the county have a light colored surface layer of silt loam that is moderate or moderately low in content of organic matter. Generally, the structure of these soils is weak. A surface crust forms during periods of heavy rainfall. The crust is hard when dry and is nearly impervious to water. As a result, it reduces the rate of water infiltration and increases the runoff rate. Regular additions of crop residue, barnyard manure, or other organic material can improve soil structure and minimize crusting.

Fall plowing is generally not a good means of improving the tilth of soils that have a light colored surface layer. If these soils are plowed in the fall, a crust forms in winter and spring. Many soils that are plowed in fall are nearly as dense and hard at planting time as they were before they were plowed.

Fall plowing is common on Nolin, Genesee, Rossburg, Landes, and Huntington soils on the bottom land along the Scioto River. It also is common on Omulga and Wyatt soils in preglacial valleys. Because of the erosion hazard, soils that have a slope of more than 3 percent should not be fall plowed. Soil blowing is a hazard in all areas that are plowed in the fall, including nearly level areas.

Some of the soils in the county do not dry out quickly enough for plowing early in spring. Quite often, the fields are plowed in the spring before optimum moisture conditions are reached. This untimely plowing results in hard clods in the surface layer.

Pasture and hayland currently make up approximately 11 percent of the acreage in Scioto County. Most of the pasture and hayland is on hillsides adjacent to cultivated areas of the less sloping soils. The soils used for hay and pasture formed mainly in material weathered from the underlying shale, siltstone, or sandstone. They are erosive soils. Bluegrass and timothy are the chief forage species. In many areas, the pasture is unimproved and pasture renovation and brush control are needed.

Pastures and meadows are overgrazed in some areas. This overgrazing has resulted in weedy, low-producing forage. Also, the hazard of erosion has increased because of the sparse, short vegetative cover. The soils in these areas commonly are acid and have a low supply of available phosphorus and potassium. Good management can restore these areas to a much higher level of forage production.

Successful establishment of forage crops requires the selection of suitable species and varieties for seeding. In areas that are reseeded, proper seedbed preparation, proper seeding methods, timely seeding, and applications of recommended lime and fertilizer are needed. The best time for seeding is usually April or August. If the pasture is to be renovated, the existing grasses and weeds should be killed or suppressed before the desirable species are seeded. The existing plants should be killed and left on or near the surface as a mulch that can reduce the erosion hazard. Nearly level pastures can be plowed. The steeper pastures should be tilled and seeded on the contour.

The no-till method of seeding is effective on most of the soils in the county, except for Doles, Fitchville, Peoga, Piopolis, Weinbach, and other poorly drained soils. If this method is to be applied, the existing vegetation should be suppressed or killed by grazing and by herbicides.

Forage species can be seeded with small grain. The resulting plant competition, however, commonly restricts forage production.

Seeding mixtures should be selected on the basis of the kind of soil and the desirable management system. Mixtures of grasses and legumes have a higher nutrient value than grasses alone. Also, the legumes provide nitrogen for the grasses. Alfalfa and red clover should be seeded on Alford, Berks, Rossburg, Shelocta, and other well drained soils. Ladino clover and alsike clover should be seeded on the wetter soils, such as Doles, Fitchville, and Weinbach. Birdsfoot trefoil, bromegrass, lespedeza, warm-season grasses, and vetch generally are not grown in Scioto County.

Applications of lime and fertilizer can ensure good productivity and can lengthen the life of the stand. Weed control by mowing, clipping, and spraying helps to maintain a high level of forage production. Weeds should be mowed before they go to seed. Control of insects, such as alfalfa weevil and potato leafhopper, may be necessary. Harvesting the forage crops at the proper stage of maturity helps to obtain the maximum quality of livestock feed. A current agronomy guide describes the proper management of the soils for forage species (*13*).

Specialty crops commercially grown in the county include tobacco, sweet corn, strawberries, spinach, and kale. The county produces about 1,116,600 pounds of burley tobacco and 18,315 pounds of cigar tobacco. The tobacco is grown dominantly on Skidmore, Shelocta, Nolin, Coolville, and Tilsit soils. Sweet corn is grown on about 45 acres, strawberries on 35 acres, spinach on 30 acres, and kale on 20 acres. Other specialty crops are cabbage, peppers, tomatoes, green beans, and cantaloupes. These crops are grown dominantly on Nolin, Rossburg, Huntington, Tioga, Shelocta, and Skidmore soils. Information about specific management measures, fertilization rates, and seed varieties can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

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

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

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (*20*). Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

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

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units."

Woodland Management and Productivity

Approximately 67 percent of Scioto County is wooded (*11*). About 198,500 acres of the woodland occurs as privately owned stands and 63,700 acres occurs as public lands. The public forests are Shawnee State Forest and Brush Creek State Forest, in the western part of the county, and Wayne National Forest, in the eastern part.

Most of the wooded acreage occurs as areas of steep or very steep soils that formed in material weathered from the underlying siltstone, sandstone, and shale bedrock. These soils are most extensive in the Shelocta-Brownsville map unit, which is described under the heading "General Soil Map Units." The wooded acreage has increased in recent years, particularly in the steep and very steep areas, where the soils are not well suited to cultivated crops or hay and are reverting to woodland.

Most of the forests support mixed hardwoods, dominantly oaks. Several major forest types are in the county, including oak-hickory, pitch pine-oak, shortleaf pine-Virginia pine-oak, and eastern redcedar on dry sites and oak-hickory, northern red oak, yellow-poplar, northern hardwood-hemlock, and bottom-land hardwoods on moist sites (*16*). The dry sites are mainly on southern aspects, on ridgetops, and in abandoned fields. The wet sites are mainly on northern aspects, on benches, and in coves and small drainageways. The bottom-land hardwoods are along the major rivers and streams.

The oak-hickory group consists of post oak-black oak and scarlet oak cover types. In areas of the post oak-black oak cover type, the dominant species is black oak. Other species are post oak, blackjack oak, white oak, scarlet oak, and hickory. Scarlet oak and black oak are the dominant species in areas of the scarlet oak cover type. Other species include chestnut oak, white oak, post oak, hickories, and pines.

The pitch pine-oak group consists of the chestnut oak cover type and, to a minor extent, the pitch pine type. Other common species in areas of the chestnut oak cover type are scarlet oak, white oak, black oak, post oak, pitch pine, blackjack oak, blackgum, and red maple. Less common are red oak, Virginia pine, shortleaf pine, sourwood, and sassafras.

The shortleaf pine-Virginia pine-oak group consists of the shortleaf pine-oak and shortleaf pine-Virginia pine cover types and, to a lesser extent, the shortleaf pine and Virginia pine types. The shortleaf pine-oak cover type is dominated by shortleaf pine. It has more oaks than the shortleaf pine-Virginia pine cover type. Some of the oaks are white, scarlet, blackjack, black, post, and chestnut oaks. In some areas the stand includes hickories, blackgum, Virginia pine, and pitch pine. The shortleaf pine-Virginia pine cover type is dominated by pines. Other species are oaks and hickories.

The eastern redcedar type is of minor extent in the county. The eastern redcedar-pine-hardwoods cover type also is of minor extent. It includes eastern redcedar, shortleaf and Virginia pines, and red and black oaks.

Some of the understory species in areas of the cover types on dry sites are dogwood, sassafras, serviceberry, and some beech and red maple. The ground cover consists of greenbrier and poison-ivy.

The oak-hickory group consists of the white oak-red oak-hickory and white oak cover types. The white oak-red oak-hickory cover type is dominated by white oak, black oak, and hickories. Other common species are scarlet oak, red maple, sugar maple, and yellow-poplar. Less common are black cherry, butternut, basswood, beech, black walnut, and blackgum. Other species in areas of the white oak cover type are black oak, shagbark and bitternut hickories, and yellow-poplar.

The northern red oak group consists of the northern red oak-basswood-white ash and northern red oak-mockernut hickory-sweetgum cover types. These types are of minor extent in the county.

The yellow-poplar group consists of the yellow-poplar and yellow-poplar-white oak-northern red oak cover types and the yellow-poplar-hemlock type, which is of minor extent in the county. Other species in areas of the yellow-poplar cover type are red maple and northern red oak. Other species in areas of the yellow-poplar-white oak-northern red oak cover type include black oak, hemlock, and blackgum.

The northern hardwood-hemlock group is represented by the beech-sugar maple cover type, which is of minor extent in the county. Other species in areas of this cover type include red maple, white oak, yellow-poplar, black cherry, and black walnut.

The bottom-land hardwoods consist of the river birch-sycamore, cottonwood, and pin oak-sweetgum cover types.

Some of the understory species in areas of the cover types on wet sites are dogwood, redbud, and spicebush. The ground cover consists of many ferns, wild ginger, Solomons-seal, jack-in-the-pulpit, Virginia creeper, and poison-ivy.

Soils differ greatly in their productivity as woodland. The factors that influence the growth of trees are almost the same as those that influence the production of annual crops and pasture. The major difference is that tree roots extend deeper into the soil, especially around rock fragments in the lower part of the soil. The direction of exposure, or aspect, and the position of the soil on the landscape also are important. Other properties to be considered are the slope, the degree of past erosion, soil reaction, the thickness of the surface soil, and the fertility level.

The best sites for woodland are generally on the lower parts of the slopes and in coves, whereas the poorer sites are generally on the upper parts of the slopes and on ridges. Furthermore, the best sites are mainly on north- and east-facing slopes, whereas the poorer sites are mainly on south- and west-facing slopes (*5*).

Aspect is the direction in which a slope faces. Site-quality differences associated with aspect are slight in areas where slopes are gentle. In steep areas, however, site-index values are much higher on northeast-facing slopes than on southwest-facing slopes. Trees grow better on the lower slopes and on northeast-facing aspects, which have a higher supply of available water and cooler temperatures because of less exposure to the prevailing wind and to direct sunlight. On south and west aspects, a higher soil temperature, a high evaporation rate, earlier snowmelt, and a greater degree of freezing and thawing limit the amount of available water during the growing season (*5*).

On southwest-facing slopes, site-index values decrease as the slope increases. The differences in site-index values associated with gradient are less pronounced on southeast and northwest aspects. On northeast-facing slopes, the values even increase slightly as the slope increases.

The position of the soil on the landscape is important in determining the amount of moisture available for tree growth. The amount of soil moisture generally increases as elevation decreases, partly because of downslope seepage. Also, the soils on the lower parts of the slopes are generally deeper than those on the upper parts, lose less moisture through evaporation, and have a somewhat lower temperature. Concave areas are better sites for woodland than convex areas, where surface water runs off more rapidly. Ridges and the upper slopes generally are convex, whereas the lower slopes and the foot slopes are commonly concave.

The slope is an important factor affecting woodland management. A steep or very steep slope seriously limits the use of equipment. As the slope increases, the rate of water infiltration decreases and the runoff rate and the hazard of erosion increase.

Many wooded areas in the county, especially the steep and very steep ones, are clearcut because selective cutting is generally not feasible. Erosion-control measures are needed during and after the harvest.

Erosion reduces the volume of soil available for water storage. Severe erosion removes the surface layer and exposes the subsoil. Because the subsoil is commonly less porous, the runoff rate increases and the rate of water intake and available water capacity decrease. Both tree growth and natural reseeding are adversely affected by severe erosion. The hazard of erosion is generally more severe along logging trails than in other parts of the forest. This hazard can be reduced by constructing effective water bars on the logging trails and by reseeding the trails.

The thickness of the surface soil affects tree height more significantly than any other single soil or topographic feature. The thickness of the surface soil and the texture of the subsoil are affected by the landscape position, aspect, and the shape and steepness of slopes (*5*).

Soil reaction and fertility influence tree growth and the suitability of the soils for different kinds of trees. Trees grow more slowly on all of the less fertile soils, but fertility has a major effect on tree production only in areas where critical nutrients are deficient (*5*).

Many of the soils in the county can produce larger and better quality wood crops than are currently being produced. Improved woodland management commonly is needed.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *L*, low strength. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and L.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. Black oak can be considered a general indicator of site index for other upland hardwoods on similar sites. These hardwoods include red oak, white oak, white ash, yellow-poplar, and black walnut (*6*).

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service, from a commercial nursery, or from the Ohio Department of Natural Resources, Division of Forestry.

Recreation

Steven E. Brown, district conservationist, Soil Conservation Service, helped prepare this section.

The recreational industry has a very good potential for growth in Scioto County. National, state, and corporate forests make up more than 80,000 acres in the county. All of these forests are open to the public for hunting, fishing, camping, picnicking, hiking, and other outdoor activities. Good lookout points are available in some areas (fig. 15). Shawnee State Forest, in the southwest part of the county, is the largest state forest in Ohio. It is known as "The Little Smokies of Ohio." It provides more than 60 miles of backpack trails and more than 70 miles of bridle trails. Shawnee State Park provides facilities for camping, golfing, boating, swimming, fishing, picnicking, hiking, and other outdoor activities. The Ohio and Scioto Rivers provide opportunities for boating, water skiing, fishing, and canoeing.

The slope of many of the soils in Scioto County limits the development for many recreational uses. Diversions, grassed waterways and outlets, and subsurface drains may be needed to control erosion and reduce wetness.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The

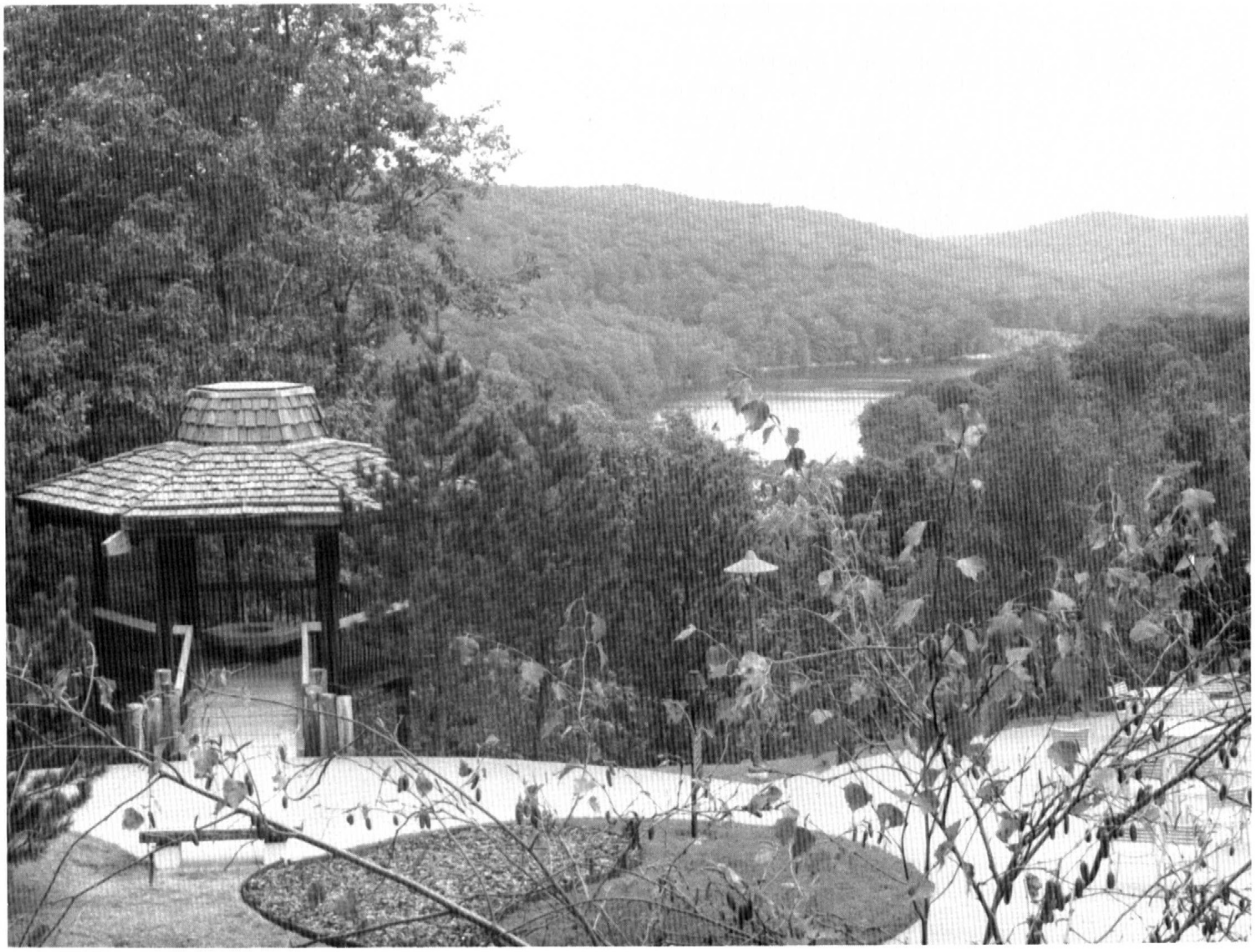


Figure 15.—An overlook adjacent to an area of the Shelocta-Brownsville association, very steep.

surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Steven E. Brown, district conservationist, Soil Conservation Service, helped prepare this section.

Scioto County has a wide variety of wildlife. Some of the more common birds that inhabit the county are bobwhite quail, wild turkey, mourning dove, ruffed grouse, common crow, pileated woodpecker, red-tailed hawk, great horned owl, meadowlark, bobolink, and many other species of songbirds. Mammalian wildlife species include cottontail rabbit, gray and fox squirrel, gray and red fox, whitetail deer, raccoon, woodchuck, mink, and beaver.

The diverse species of wildlife inhabit a wide variety of wildlife habitats, including openland, woodland, and areas along rivers and streams.

Upland wildlife habitat is made up of both openland and woodland. The major soils in the areas of upland wildlife habitat are Shelocta, Wharton, and Latham soils. Including grasses and legumes in the cropping sequence, applying a system of conservation tillage, constructing ponds, and planting trees and shrubs can improve the habitat for openland wildlife. Applying measures that improve timber stands, excluding livestock from wooded areas, and planting trees and shrubs can improve the habitat for woodland wildlife.

The major riparian areas in the county are along the Ohio River, the Big and Little Scioto Rivers, Scioto Brush Creek, Rocky Fork, and Pine Creek. The dominant soils in these areas are Nolin, Genesee, and Tioga soils. Stabilizing streambanks, erecting nest boxes for wood ducks, and planting trees and shrubs can improve the riparian habitat.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor (*1*). A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are foxtail, ragweed, goldenrod, beggarweed, Johnsongrass, and fern.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and sumac. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are honeysuckle, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, groundhogs, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver (fig. 16).

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are

Figure 16.—A beaver pond in an area of Stendal silt loam, occasionally flooded, in a narrow stream valley.

given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Hillside slippage can damage the buildings (fig. 17). Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered in the ratings.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil

Figure 17.—A home on Wharton soils that has been damaged by a landslide in an adjacent area of the very steep Shelocta and Brownsville soils.

properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 20.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

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

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 18). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

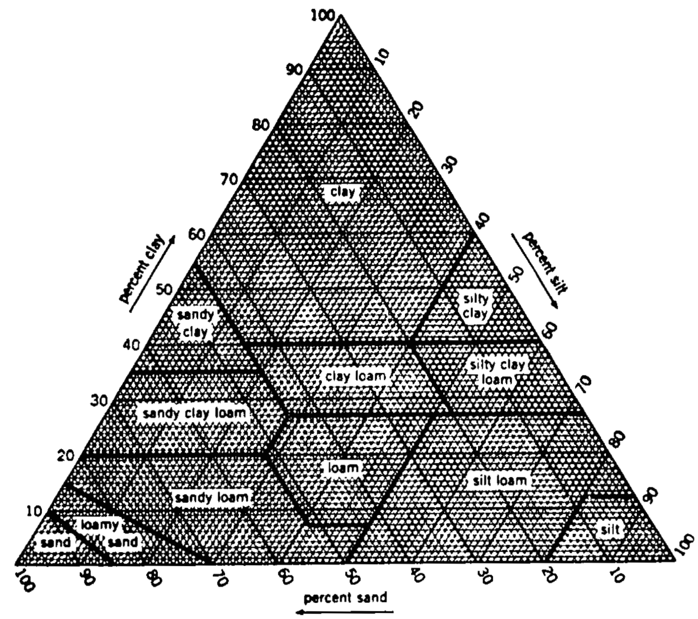


Figure 18.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Classification of the soils is determined according to the Unified soil classification system (*3*) and the system adopted by the American Association of State Highway and Transportation Officials (*2*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Flooding is a severe hazard along the Ohio and Scioto Rivers. Major floods occurred in the county in 1913 and 1937. Portsmouth and other urban areas were severely damaged during these floods. A floodwall completed in 1950 protects Portsmouth against floods as high as the 1937 flood. Because of flood-control structures constructed upstream from Scioto County, the same amount of rainfall currently would result in a flood with water levels 8 to 10 feet lower than those of the 1937 flood. An intermediate regional flood is one that occurs, on the average, once in 100 years. It is a major flood, but it is not considered an extreme flood. In table 19, intermediate regional flood elevations are compared to the 1937 flood elevations at selected locations in Scioto County (*23*).

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Physical and Chemical Analyses of Selected Soils

Many of the soils in Scioto County were analyzed by the Soil Characterization Laboratory, Department of Agronomy, Ohio State University, Columbus, Ohio. The physical and chemical data obtained from most of the samples include particle-size distribution, reaction, organic matter content, calcium carbonate equivalent, and extractable cations.

These data were used in classifying and correlating the soils and in evaluating their behavior under various land uses. Four pedons were selected as representative of their respective series and are described under the heading "Soil Series and Their Morphology." These series and their laboratory identification numbers are Brownsville series (SC-7), Coolville series (SC-12), Omulga series (SC-8), and Wyatt series (SC-11).

In addition to the data from Scioto County, laboratory data are available from nearby counties in southern Ohio, which have many of the same soils. Data from these counties and from Scioto County are on file at the Department of Agronomy, Ohio State University; the Ohio Department of Natural Resources, Division of Soil and Water Conservation; and the Soil Conservation Service, State Office, Columbus, Ohio.

Engineering Index Test Data

Table 20 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Ohio Department of Transportation, Division of Highways, Bureau of Testing, Soils and Foundation Section.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); and Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*21*). 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 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten 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 Ultisol.

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 Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

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 Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic 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. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly 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, depth 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 Typic Hapludults.

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. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*19*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*21*). 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."

Alford Series

The Alford series consists of deep, well drained, moderately permeable soils on shoulder slopes and ridgetops in the uplands. These soils formed in loess. Slope ranges from 10 to 25 percent.

Alford soils are commonly adjacent to Latham, Omulga, Shelocta, and Wharton soils. Latham soils are moderately deep over bedrock. Latham and Wharton soils are on side slopes and foot slopes. Latham soils also are on ridgetops. Shelocta and Wharton soils have a higher content of coarse fragments in the subsoil than the Alford soils. Shelocta soils are on side slopes and toe slopes. Omulga soils have a fragipan. They are in preglacial valleys.

Typical pedon of Alford silt loam, 10 to 25 percent slopes, in an area of Valley Township about 1 mile south-southeast of Lucasville; about 840 feet east and 120 feet south of the northwest corner of sec. 5, T. 2 N., R. 21 W.

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak fine and medium granular structure; friable; common fine and medium roots; neutral; abrupt smooth boundary.

E—5 to 10 inches; dark yellowish brown (10YR 4/6) silt loam; weak fine and medium subangular blocky structure; friable; few fine roots; neutral; clear wavy boundary.

BE—10 to 17 inches; strong brown (7.5YR 4/6) silt loam; weak medium subangular blocky structure; friable; few fine roots; few faint strong brown (7.5YR 4/6) silt coatings on faces of peds; slightly acid; clear wavy boundary.

Bt1—17 to 27 inches; strong brown (7.5YR 4/6) silt loam; moderate medium subangular blocky structure; friable; few faint strong brown (7.5YR 4/6) clay films on faces of peds; few faint yellowish brown (10YR 5/6) silt coatings on faces of peds; slightly acid; clear wavy boundary.

Bt2—27 to 37 inches; strong brown (7.5YR 5/6) silt loam; moderate medium and coarse subangular blocky structure; friable; few distinct brown (10YR 4/3) clay films on faces of peds; few distinct dark yellowish brown (10YR 4/4) silt coatings on faces of peds; few fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides) on faces of peds; medium acid; clear wavy boundary.

Bt3—37 to 60 inches; strong brown (7.5YR 5/6) silt loam; few medium prominent very pale brown (10YR 7/4) and pale brown (10YR 6/3) mottles; moderate medium and coarse subangular blocky structure; friable; common faint yellowish brown (10YR 5/6) clay films on faces of peds; few fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides) on faces of peds; medium acid; clear wavy boundary.

Bt4—60 to 70 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; common faint yellowish brown (10YR 5/4) clay films on faces of peds; medium acid.

The thickness of the solum ranges from 60 to more than 80 inches. The depth to bedrock is more than 60 inches.

The Ap horizon has value of 3 or 4. The Bt horizon has chroma of 4 to 6. It is silt loam or silty clay loam.

Berks Series

The Berks series consists of moderately deep, well drained soils on ridgetops in the uplands. These soils formed in material weathered from siltstone and fine grained sandstone. Permeability is moderate or moderately rapid. Slope ranges from 8 to 15 percent.

Berks soils are commonly adjacent to Brownsville, Gilpin, Latham, Shelocta, and Wharton soils on ridgetops and hillsides. Brownsville and Shelocta soils are deep over bedrock. Gilpin, Latham, Shelocta, and Wharton soils have fewer coarse fragments in the subsoil than the Berks soils.

Typical pedon of Berks channery silt loam, 8 to 15 percent slopes, in an area of Nile Township about 8.75 miles northwest of Friendship; about 200 feet west of the junction of State Route 125 and State Forest Road 6, along State Route 125, then 1,920 feet south:

Oe—1 inch to 0; partially decomposed leaf litter.

A—0 to 2 inches; dark gray (10YR 4/1) channery silt loam, gray (10YR 5/1) dry; weak medium and fine granular structure; friable; many roots; very dark gray (10YR 3/1) organic coatings; about 15 percent coarse fragments; very strongly acid; abrupt smooth boundary.

Bw1—2 to 8 inches; light yellowish brown (10YR 6/4) channery silt loam; moderate medium and fine subangular blocky structure; friable; many roots; about 20 percent coarse fragments; very strongly acid; clear smooth boundary.

Bw2—8 to 17 inches; yellowish brown (10YR 5/4) very channery silt loam; moderate medium and fine subangular blocky structure; friable; common roots; about 55 percent coarse fragments; very strongly acid; abrupt smooth boundary.

BC—17 to 22 inches; yellowish brown (10YR 5/4) extremely flaggy silt loam; structure obscured by coarse fragments; friable; few roots; about 80 percent coarse fragments; strongly acid; clear smooth boundary.

C—22 to 28 inches; yellowish brown (10YR 5/4) extremely flaggy silt loam; structure obscured by coarse fragments; friable; few roots; about 80 percent coarse fragments; strongly acid; clear smooth boundary.

R—28 to 35 inches; fractured, fine grained sandstone bedrock.

The thickness of the solum ranges from 18 to 38 inches. The depth to bedrock ranges from 20 to 40 inches. The bedrock is rippable, fine grained sandstone or siltstone. The content of siltstone or fine grained sandstone fragments ranges from 10 to 35 percent in the A horizon, from 20 to 75 percent in the B horizon, and from 35 to 90 percent in the C horizon.

The A horizon has value of 3 to 5 and chroma of 1 to 4. It is typically channery silt loam but is silt loam or channery loam in some pedons. The B horizon has hue of 10YR or 7.5YR and chroma of 4 to 8. It is channery or flaggy silt loam.

Bethesda Series

The Bethesda series consists of deep, well drained, moderately slowly permeable soils in surface-mined areas on uplands. These soils formed in a mixture of partly weathered fine-earth material and fragments of shale, sandstone, and siltstone. Slope ranges from 8 to 25 percent.

Bethesda soils are commonly adjacent to Berks, Brownsville, Gilpin, Latham, and Shelocta soils, which are in areas that have not been mined. Berks, Gilpin, and Latham soils are moderately deep. Brownsville soils have a Bw horizon. The content of coarse fragments between depths of 10 and 40 inches in the Gilpin, Latham, and Shelocta soils is less than 35 percent.

Typical pedon of Bethesda very shaly clay loam, 8 to 25 percent slopes, in an area of Clay Township about 1.1 miles east of Rubyville; about 1,600 feet south and 200 feet west of the northeast corner of sec. 13, T. 2 N., R. 21 W.

A—0 to 6 inches; about 70 percent variegated light olive brown (2.5Y 5/4), 20 percent light gray (10YR 6/1), and 10 percent yellowish brown (10YR 5/8) very shaly clay loam; weak coarse granular structure; friable; common roots; about 50 percent coarse fragments; medium acid; gradual irregular boundary.

C1—6 to 18 inches; about 70 percent variegated light olive brown (2.5Y 5/4), 20 percent strong brown (7.5YR 5/8), and 10 percent brownish yellow (10YR 6/6) extremely shaly clay loam; massive; friable; few roots; about 60 percent coarse fragments; very strongly acid; clear smooth boundary.

C2—18 to 26 inches; about 60 percent variegated light olive brown (2.5Y 5/6) and 40 percent brown (10YR 5/3) channery sandy loam; massive; friable; few roots; about 30 percent coarse fragments; very strongly acid; clear wavy boundary.

C3—26 to 36 inches; about 60 percent variegated brown (10YR 5/3), 20 percent dark grayish brown (10YR 4/2), and 20 percent gray (10YR 5/1) very channery sandy loam; massive; friable; few roots; about 40 percent coarse fragments; very strongly acid; diffuse wavy boundary.

C4—36 to 60 inches; about 70 percent variegated brown (10YR 5/3), 20 percent strong brown (7.5YR 5/8), and 10 percent gray (10YR 6/1) very channery clay loam; massive; friable; about 45 percent coarse fragments; medium acid to very strongly acid.

The depth to bedrock is more than 60 inches. The content of rock fragments between depths of 10 and 40 inches ranges from 30 to 60 percent and averages about 45 percent. The coarse fragments commonly are 0.1 inch to 10 inches across, but some are stones and boulders.

The A and C horizons have hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 8. The C horizon has fine-earth textures of clay loam, silty clay loam, sandy loam, loamy sand, silt loam, or loam.

Brownsville Series

The Brownsville series consists of deep, well drained soils on hillsides in the uplands. These soils formed in residuum and colluvium derived from siltstone and fine grained sandstone. Permeability is moderate or moderately rapid. Slope ranges from 25 to 70 percent.

Brownsville soils are commonly adjacent to Berks, Ernest, Latham, Shelocta, and Wharton soils. Berks and Latham soils are moderately deep over bedrock. Berks soils are on ridgetops, and Latham soils are on ridgetops and hillsides. Ernest, Shelocta, and Wharton soils have fewer coarse fragments in the subsoil than the Brownsville soils. Ernest soils are on foot slopes. Shelocta and Wharton soils are on side slopes and foot slopes. Shelocta soils also are on fans.

Typical pedon of Brownsville silt loam, in an area of the Shelocta-Brownsville association, very steep, about 5 miles north of Buena Vista; in Nile Township; about 1,600 feet northeast of the intersection of Twin Creek and Upper Twin Creek-Rocky Fork Road, along Upper Twin Creek-Rocky Fork Road, then 480 feet east:

Oe—1 inch to 0; partially decomposed leaf litter.

A—0 to 3 inches; yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/4) dry; weak medium and fine granular structure; friable; many roots; about 5 percent coarse fragments; extremely acid; clear wavy boundary.

Bw1—3 to 12 inches; light yellowish brown (10YR 6/4) channery silt loam; moderate medium subangular blocky structure; friable; common roots; about 15 percent coarse fragments; very strongly acid; clear wavy boundary.

Bw2—12 to 20 inches; light yellowish brown (10YR 6/4) very channery silt loam; moderate medium subangular blocky structure; friable; few roots; about 55 percent coarse fragments; very strongly acid; clear wavy boundary.

Bw3—20 to 27 inches; light yellowish brown (10YR 6/4) extremely channery silt loam; moderate medium subangular blocky structure; friable; few roots; about 65 percent coarse fragments; strongly acid; clear wavy boundary.

BC—27 to 43 inches; light yellowish brown (10YR 6/4) extremely channery silt loam; massive; firm; few roots; about 70 percent coarse fragments; very strongly acid; clear wavy boundary.

C—43 to 60 inches; light yellowish brown (10YR 6/4) extremely channery silt loam; massive; firm; about 75 percent coarse fragments; very strongly acid.

The thickness of the solum ranges from 36 to 50 inches. The depth to fine grained sandstone or siltstone bedrock ranges from 40 to 72 inches.

The A horizon has value of 3 to 5 and chroma of 2 to 4. It is silt loam or channery silt loam. The B horizon has value of 5 or 6 and chroma of 3 to 6. The content of coarse fragments in this horizon ranges from 15 to 85 percent. These fragments are siltstone or fine grained sandstone. The C horizon has value of 5 or 6 and chroma of 4 to 6. The content of coarse fragments in this horizon ranges from 35 to 75 percent.

Casco Series

The Casco series consists of deep, well drained soils on slope breaks on terraces. These soils formed in loamy glacial outwash over outwash of sand and gravel. Permeability is moderate in the subsoil and very rapid in the substratum. Slope ranges from 40 to 70 percent.

Casco soils are commonly adjacent to Elkinsville, Fitchville, Nolin, Ockley, and Sciotoville soils. Elkinsville, Fitchville, Nolin, and Sciotoville soils have less sand and gravel throughout than the Casco soils, and Ockley soils have a thicker solum. Elkinsville soils are in landscape positions similar to those of the Casco soils. Fitchville, Ockley, and Sciotoville soils are on the less sloping parts of the terraces. Nolin soils are on flood plains.

Typical pedon of Casco loam, 40 to 70 percent slopes, in an area of Clay Township about 1.25 miles north-northwest of Rosemount; about 2,560 feet west and 30 feet north of the southeast corner of sec. 20, T. 2 N., R. 21 W.

Oe—2 inches to 0; partially decomposed leaf litter.

A—0 to 4 inches; brown (10YR 4/3) loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; many fine and medium roots; about 10 percent gravel; neutral; abrupt smooth boundary.

Bt1—4 to 12 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; friable; common fine and medium roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; about 10 percent coarse fragments; slightly acid; clear smooth boundary.

Bt2—12 to 20 inches; brown (10YR 4/3) gravelly clay loam; moderate fine and medium subangular blocky structure; friable; common fine and medium roots; few faint yellowish brown (10YR 5/4) clay films on faces of peds; about 20 percent gravel; slight effervescence in a few weathered pebbles; neutral; abrupt smooth boundary.

2C1—20 to 36 inches; brown (10YR 5/3) very gravelly sand; single grained; loose; few fine roots; about 50 percent coarse fragments; thin strata of very gravelly loamy sand; strong effervescence; mildly alkaline; clear wavy boundary.

2C2—36 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; about 20 percent coarse fragments; strong effervescence; mildly alkaline.

The solum is 14 to 24 inches thick. The depth to carbonates ranges from 10 to 24 inches.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is loam, silt loam, sandy loam, or the gravelly analogs of these textures. The B horizon has hue of 10YR or 7.5YR and value of 3 to 5. It is clay loam, sandy clay loam, or the gravelly analogs of these textures. The 2C horizon has value of 4 or 5 and chroma of 3 or 4. It is poorly sorted to well sorted, calcareous sand and gravel. The content of gravel in this horizon ranges from 5 to 55 percent.

Coolville Series

The Coolville series consists of deep, moderately well drained soils in the uplands. These soils formed in loess and in the underlying acid shale residuum. Permeability is moderate in the upper part of the solum and slow or very slow in the lower part. Slope ranges from 1 to 15 percent.

Coolville soils are commonly adjacent to Latham, Rarden, Shelocta, and Tilsit soils. Latham and Rarden soils are moderately deep over bedrock. Latham soils are on ridgetops, foot slopes, and side slopes. Rarden soils are on shoulder slopes and ridgetops. Shelocta soils are mainly on hillsides. They have less clay in the subsoil than the Coolville soils. Tilsit soils have a fragipan. They are on the flatter parts of ridgetops.

Typical pedon of Coolville silt loam, 1 to 8 percent slopes, in an area of Rush Township about 2.5 miles west-southwest of Lucasville; about 1,400 feet southeast of the intersection of State Route 348 and Owensville Road, along Owensville Road, then 1,000 feet east:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; moderate medium granular structure; friable; many roots; few brown (10YR 5/3 and 7.5YR 5/4) specks of subsoil material; many medium very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

Bt1—8 to 18 inches; strong brown (7.5YR 5/6) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common roots; few faint brown (10YR 4/3) clay films on faces of peds; common distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; yellowish brown (10YR 5/4) worm casts; common medium very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); few coarse fragments; very strongly acid; clear wavy boundary.

2Bt2—18 to 23 inches; brown (7.5YR 5/4) silty clay; common fine prominent red (2.5YR 4/8) and few fine prominent grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; common roots; few prominent gray (10YR 6/1) clay films on faces of peds; common distinct strong brown (7.5YR 5/6) silt coatings on faces of peds; common medium very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.

2Bt3—23 to 27 inches; yellowish red (5YR 4/6) silty clay; few medium prominent yellowish brown (10YR 5/4), few fine prominent grayish brown (10YR 5/2), and few fine prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; few roots; common distinct gray (10YR 6/1) clay films on faces of peds; common distinct red (2.5YR 4/8) silt coatings on faces of peds; about 5 percent coarse fragments; extremely acid; clear wavy boundary.

2Bt4—27 to 35 inches; strong brown (7.5YR 5/6) silty clay; common medium prominent light brownish gray (10YR 6/2) and common medium distinct brown (7.5YR 5/4) mottles; moderate fine angular blocky structure; firm; few roots; common prominent gray (10YR 6/1) clay films on faces of peds; few faint strong brown (7.5YR 5/6) silt coatings on faces of peds; about 5 percent coarse fragments; extremely acid; clear wavy boundary.

2BC—35 to 45 inches; yellowish brown (10YR 5/4) shaly silty clay loam; weak medium angular blocky structure; firm; many prominent gray (10YR 6/1) clay films on coarse fragments; about 25 percent coarse fragments; extremely acid; gradual smooth boundary.

2Cr—45 to 50 inches; olive brown (2.5Y 4/4), soft, thinly bedded shale that can be cut with a spade.

The solum is 36 to 45 inches thick. The depth to bedrock ranges from 40 to 60 inches.

The Ap horizon has value of 4 or 5. The Bt and 2Bt horizons have hue of 10YR to 5YR and chroma of 4 to 6. Some pedons have a C horizon.

Cuba Series

The Cuba series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in acid, silty alluvium. Slope is 0 to 2 percent.

Cuba soils are similar to Haymond, Huntington, and Nolin soils and are commonly adjacent to Haymond, Stendal, and Tioga soils. Haymond, Huntington, and Nolin soils are less acid throughout than the Cuba soils. Haymond and Tioga soils are in landscape positions similar to those of the Cuba soils. Tioga soils have more sand and less clay in the subsoil than the Cuba soils. The somewhat poorly drained Stendal soils are in the lower positions.

Typical pedon of Cuba silt loam, occasionally flooded, in an area of Bloom Township about 2.5 miles east-southeast of South Webster; about 640 feet north and 1,800 feet east of the southwest corner of sec. 18, T. 4 N., R. 18 W.

Ap—0 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak coarse granular structure; friable; few roots; thin continuous dark brown (10YR 3/3) silt coatings on faces of peds; brown (10YR 4/3) worm casts; slightly acid; abrupt smooth boundary.

Bw1—11 to 23 inches; yellowish brown (10YR 5/6) silt loam; weak medium and coarse angular and subangular blocky structure; friable; few roots; common faint yellowish brown (10YR 5/6) silt coatings on faces of peds; few mica flakes; few coarse fragments; strongly acid; clear wavy boundary.

Bw2—23 to 37 inches; yellowish brown (10YR 5/4) silt loam; common fine faint yellowish brown (10YR 5/6) mottles; weak medium and coarse angular and subangular blocky structure; friable; few roots; common faint yellowish brown (10YR 5/4) silt coatings on faces of peds; few mica flakes; very strongly acid; clear smooth boundary.

C1—37 to 51 inches; dark yellowish brown (10YR 4/6) silt loam; common medium distinct light brownish gray (10YR 6/2) and common fine distinct very pale brown (10YR 7/3) mottles; massive; friable; few fine black (10YR 2/1) stains (iron and manganese oxides); few mica flakes; very strongly acid; clear wavy boundary.

C2—51 to 60 inches; dark yellowish brown (10YR 4/6) silt loam; common medium distinct pale brown (10YR 6/3) and dark yellowish brown (10YR 3/4) mottles; massive; friable; common medium black (10YR 2/1) stains (iron and manganese oxides); few mica flakes; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The Bw horizon has value of 4 or 5.

Doles Series

The Doles series consists of deep, somewhat poorly drained, slowly permeable soils in preglacial valleys. These soils formed in loess and silty colluvium or old alluvium. Slope ranges from 0 to 3 percent.

Doles soils are similar to Weinbach soils and are commonly adjacent to Omulga and Wyatt soils. Weinbach soils have mica flakes throughout the solum.

The moderately well drained Omulga and Wyatt soils are in the more sloping areas.

Typical pedon of Doles silt loam, 0 to 3 percent slopes, in an area of Harrison Township about 1.5 miles southeast of Minford; about 400 feet south and 1,850 feet east of the northwest corner of sec. 10, T. 3 N., R. 20 W.

Oe—1 inch to 0; partially decomposed leaf litter.

A—0 to 4 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; weak fine and medium granular structure; friable; many roots; few fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); very strongly acid; gradual wavy boundary.

E—4 to 8 inches; yellowish brown (10YR 5/4) silt loam; few fine faint pale brown (10YR 6/3) mottles; weak fine and medium subangular blocky structure; friable; common roots; many fine and medium very dark grayish brown (10YR 3/2) concretions and stains (iron and manganese oxides); very strongly acid; clear wavy boundary.

BE—8 to 12 inches; yellowish brown (10YR 5/6) silt loam; common medium prominent light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few roots; few faint yellowish brown (I0YR 5/6) clay films on faces of peds; common distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; common fine and medium very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); very strongly acid; clear wavy boundary.

Bt—12 to 20 inches; yellowish brown (10YR 5/6) silt loam; few fine prominent light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few roots; many distinct grayish brown (10YR 5/2) and common distinct yellowish brown (10YR 5/8) clay films on faces of peds; common prominent light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt coatings on faces of peds; few fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

Btx1—20 to 26 inches; yellowish brown (10YR 5/4) silt loam; common medium prominent strong brown (7.5YR 5/6) and common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; few roots; common prominent brown (10YR 4/3) clay films on faces of peds; few faint yellowish brown (10YR 5/4) silt coatings on faces of peds; common fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); very strongly acid; clear wavy boundary.

Btx2—26 to 38 inches; yellowish brown (10YR 5/4) silt loam; common medium prominent strong brown (7.5YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to moderate medium angular blocky; very firm; brittle; many distinct brown (10YR 4/3) and few distinct strong brown (7.5YR 5/6) clay films on faces of peds; common faint yellowish brown (10YR 5/4) silt coatings on faces of peds; common fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); strongly acid; clear wavy boundary.

Btx3—38 to 53 inches; yellowish brown (10YR 5/6) silt loam; common medium prominent strong brown (7.5YR 5/8) and common fine distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to moderate thin and medium platy; very firm; brittle; many prominent brown (10YR 4/3) clay films on faces of peds; few prominent light brownish gray (10YR 6/2) silt coatings on faces of peds; few fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); medium acid; clear wavy boundary.

BC—53 to 62 inches; yellowish brown (10YR 5/6) silt loam; common medium prominent brown (7.5YR 5/2) and few fine prominent light brownish gray (10YR 6/2) mottles; moderate medium platy structure; firm; few prominent brown (10YR 4/3) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; medium acid.

The thickness of the solum ranges from 52 to 95 inches. The depth to the top of the fragipan is 20 to 30 inches.

The A horizon has value of 4 or 5 and chroma of 2 or 3. The E and Bt horizons have chroma of 2 to 6. The Btx and BC horizons have hue of 10YR or 7.5YR and chroma of 4 to 6. Some pedons have a C horizon. This horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 4 and is mottled.

Elkinsville Series

The Elkinsville series consists of deep, well drained, moderately permeable soils on terraces along streams. These soils formed in old alluvium. Slope ranges from 1 to 40 percent.

Elkinsville soils are similar to Sardinia soils and are commonly adjacent to Fitchville, Sardinia, Sciotoville, Weinbach, and Wheeling soils. Fitchville and Weinbach soils are somewhat poorly drained and are in the slightly lower landscape positions. Sardinia, Sciotoville, and Wheeling soils are in landscape positions similar to those of the Elkinsville soils. Sardinia and Sciotoville soils are moderately well drained. Wheeling soils have more sand in the subsoil and substratum than the Elkinsville soils.

Typical pedon of Elkinsville silt loam, 1 to 8 percent slopes, in an area of Green Township about 1 mile northwest of Haverhill; about 8,200 feet south of the intersection of Gallia Pike and Junior Furnace Road, along Gallia Pike, then 1,150 feet west:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; few fine roots; few faint brown (10YR 4/3) silt coatings on faces of peds; mixed with about 10 percent yellowish brown (10YR 5/6) subsoil material; few fine dark brown (7.5YR 4/2) stains (iron and manganese oxides); medium acid; abrupt smooth boundary.

Bt1—10 to 21 inches; yellowish brown (10YR 5/6) silty clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; few fine roots; common distinct brown (10YR 5/3) clay films and silt coatings on faces of peds; few fine dark brown (7.5YR 3/2) stains (iron and manganese oxides); medium acid; gradual wavy boundary.

Bt2—21 to 31 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; few distinct brown (7.5YR 5/4) clay films and silt coatings on faces of peds; few medium dark reddish brown (5YR 3/3) and very dark gray (10YR 3/1) stains (iron and manganese oxides); medium acid; clear smooth boundary.

Bt3—31 to 44 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; common distinct brown (7.5YR 5/4) clay films on faces of peds; few fine dark reddish brown (5YR 3/3) stains (iron and manganese oxides); strongly acid; clear smooth boundary.

BC—44 to 60 inches; dark brown (7.5YR 4/4) silt loam; common medium faint brown (7.5YR 5/4) mottles; weak fine and medium subangular blocky structure; friable; common medium dark reddish brown (5YR 3/3) stains (iron and manganese oxides); strongly acid; clear smooth boundary.

C—60 to 70 inches; dark brown (7.5YR 4/4) loam; common fine distinct strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/4) mottles; massive; friable; common medium dark reddish brown (5YR 3/4) and few medium very dark gray (N 3/0) stains (iron and manganese oxides); strongly acid.

The thickness of the solum ranges from 40 to 60 inches. In some pedons the content of coarse fragments in the B horizon is 1 to 5 percent.

The Ap horizon has chroma of 2 or 3. The B horizon has value of 4 or 5 and chroma of 4 to 6. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or loam.

Ernest Series

The Ernest series consists of deep, moderately well drained soils on foot slopes in the uplands. These soils formed in colluvium derived from shale, siltstone, and sandstone. They have a fragipan. Permeability is moderate above the fragipan and slow or moderately slow in the fragipan. Slope ranges from 15 to 25 percent.

Ernest soils are commonly adjacent to Brownsville, Monongahela, Omulga, Shelocta, and Wharton soils. Brownsville soils have a higher content of coarse fragments in the subsoil than the Ernest soils. Monongahela and Omulga soils have fewer angular coarse fragments in the subsoil than the Ernest soils. Shelocta and Wharton soils do not have a fragipan. Brownsville, Shelocta, and Wharton soils are on hillsides. Shelocta soils also are on fans. Monongahela and Omulga soils are in preglacial valleys.

Typical pedon of Ernest silt loam, 15 to 25 percent slopes, in an area of Madison Township about 5 miles northeast of Minford; about 1,400 feet east and 400 feet south of the northwest corner of sec. 19, T. 5 N., R. 19 W.

Oe—1 inch to 0; partially decomposed leaf litter.

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak medium granular structure; friable; many roots; about 5 percent coarse fragments; medium acid; abrupt smooth boundary.

BE—5 to 15 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common roots; common faint yellowish brown (10YR 5/4) silt coatings on faces of peds; about 10 percent coarse fragments; strongly acid; clear wavy boundary.

Bt—15 to 24 inches; yellowish brown (10YR 5/4) channery silt loam; common medium distinct brown (7.5YR 5/4) mottles; weak medium subangular blocky structure; friable; common roots; common distinct brown (10YR 5/3) clay films on coarse fragments and on faces of peds; common faint yellowish brown (10YR 5/4) silt coatings on faces of peds; about 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

Btx1—24 to 31 inches; yellowish brown (10YR 5/4) channery loam; few fine distinct light brownish gray (10YR 6/2) and few fine prominent strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm; brittle; few roots; common faint yellowish brown (10YR 5/4) clay films on faces of peds; common medium black (10YR 2/1) concretions (iron and manganese oxides); about 20 percent coarse fragments; strongly acid; clear smooth boundary.

Btx2—31 to 42 inches; yellowish brown (10YR 5/4) channery loam; few fine distinct light brownish gray

(10YR 6/2) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm; brittle; common faint yellowish brown (10YR 5/4) clay films on faces of peds; common medium black (10YR 2/1) concretions (iron and manganese oxides); about 15 percent coarse fragments; strongly acid; clear wavy boundary.

Btx3—42 to 60 inches; yellowish brown (10YR 5/4) loam; common medium distinct light gray (10YR 7/2) and brown (7.5YR 5/4) mottles; weak very coarse prismatic structure parting to weak medium subangular blocky; very firm; brittle; common prominent light gray (10YR 7/2) clay films on coarse fragments; common medium black (10YR 2/1) concretions (iron and manganese oxides); about 10 percent coarse fragments; strongly acid.

The thickness of the solum ranges from 36 to 72 inches. The depth to the top of the fragipan is 22 to 28 inches. The depth to bedrock is more than 60 inches.

The Ap horizon has chroma of 2 or 3. Some pedons have an A horizon, which has value of 3. The B horizon has chroma of 4 to 6. The BE and Bt horizons are silt loam or channery silt loam. The Bx horizon is loam or channery loam.

Fitchville Series

The Fitchville series consists of deep, somewhat poorly drained, moderately slowly permeable soils on terraces along streams. These soils formed in old alluvium. Slope ranges from 0 to 3 percent.

Fitchville soils are commonly adjacent to Elkinsville, Ockley, Peoga, Sardinia, and Wheeling soils. The well drained Elkinsville, Ockley, and Wheeling and moderately well drained Sardinia soils are in the higher landscape positions. The poorly drained Peoga soils are on flats and in depressions.

Typical pedon of Fitchville silt loam, 0 to 3 percent slopes, in an area of Nile Township about 0.8 mile east of Friendship; about 1,080 feet southeast of the intersection of U.S. Route 52 and Drews Lane, along Drews Lane, then 1,440 feet east:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; common roots; brown (10YR 4/3) worm casts; medium acid; clear smooth boundary.

Btg—10 to 16 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable; few roots; few faint grayish brown (10YR 5/2) clay films on faces of peds; common medium very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); medium acid; clear wavy boundary.

Bt1—16 to 27 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct gray (10YR 6/1) and common medium prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few roots; common prominent gray (10YR 6/1) clay films on faces of peds; common prominent strong brown (7.5YR 5/8) silt coatings on faces of peds; common fine black (10YR 2/1) stains and concretions (iron and manganese oxides); medium acid; clear wavy boundary.

Bt2—27 to 35 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; many fine and medium vary dark grayish brown (10YR 3/2) and black (10YR 2/1) concretions (iron and manganese oxides); medium acid; clear wavy boundary.

Bt3—35 to 47 inches; yellowish brown (10YR 5/6) silty clay loam; few medium distinct gray (10YR 6/1) and common fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few roots; many prominent gray (10YR 6/1) and brown (10YR 5/3) clay films on faces of peds; common fine and medium black (10YR 2/1) stains and concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Bt4—47 to 55 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; firm; many distinct grayish brown (10YR 5/2) clay films on faces of peds; many medium black (10YR 2/1) and very dark grayish brown (10YR 3/2) stains and concretions (iron and manganese oxides); medium acid; clear wavy boundary.

C—55 to 80 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; massive; firm; many prominent gray (10YR 5/1 and 6/1) clay films lining some pores; common medium black (10YR 2/1) stains (iron and manganese oxides); medium acid.

The solum ranges from 30 to 70 inches in thickness. In most pedons it has no coarse fragments. The content of these fragments in the C horizon is as much as 5 percent.

The Ap horizon has chroma of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 6. It is silt loam or silty clay loam. The C horizon has value of 4 or 5. It is silt loam, silty clay loam, or clay loam.

Genesee Series

The Genesee series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slope is 0 to 2 percent.

Genesee soils are similar to Rossburg soils and are commonly adjacent to Huntington, Landes, Nolin, and Rossburg soils. Huntington, Landes, and Rossburg soils have a mollic epipedon. They are in the slightly higher positions on the flood plains. Huntington and Nolin soils have less sand between depths of 10 and 40 inches than the Genesee soils. Nolin soils are in landscape positions similar to those of the Genesee soils. Landes soils have less clay between depths of 10 and 40 inches than the Genesee soils.

Typical pedon of Genesee silt loam, occasionally flooded, in an area of Valley Township about 1.25 miles south of Lucasville; about 2,300 feet south and 3,390 feet west of the northeast corner of sec. 6, T. 2 N., R. 21 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak medium and fine granular structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; abrupt smooth boundary.

C1—8 to 12 inches; brown (10YR 4/3) silt loam; moderate medium and fine granular structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

C2—12 to 24 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium granular structure; friable; few fine roots; few distinct brown (10YR 4/3) silt coatings on faces of peds; neutral; clear smooth boundary.

C3—24 to 32 inches; brown (10YR 4/3) silt loam; moderate medium and fine granular structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; mildly alkaline; clear smooth boundary.

C4—32 to 46 inches; dark yellowish brown (10YR 4/4) loam; weak coarse and medium granular structure; friable; few fine roots; few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; slight effervescence; mildly alkaline; clear smooth boundary.

C5—46 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; few fine roots; strong effervescence; moderately alkaline; abrupt smooth boundary.

C6—60 to 82 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; friable; strong effervescence; moderately alkaline.

The depth to free carbonates ranges from 22 to 40 inches. The A horizon has chroma of 2 to 4. It is dominantly silt loam but is loam in some pedons. The C horizon has value of 4 or 5. It is commonly silt loam, loam, or sandy loam, but it has thin strata of loamy sand or sand below a depth of 50 inches in many pedons.

Gilpin Series

The Gilpin series consists of moderately deep, well drained, moderately permeable soils on shoulder slopes in the uplands. These soils formed in sandstone and siltstone residuum. Slope ranges from 8 to 20 percent.

Gilpin soils are similar to Shelocta and Wharton soils and are commonly adjacent to Berks, Brownsville, Latham, Shelocta, Steinsburg, and Wharton soils. The content of coarse fragments in the subsoil of Berks and Brownsville soils is more than 35 percent. Brownsville, Shelocta, and Wharton soils are deep over bedrock. Latham soils are moderately well drained. They have more clay in the subsoil than the Gilpin soils. Steinsburg soils have more sand in the subsoil than the Gilpin soils. Berks soils are on ridgetops. Brownsville, Shelocta, and Wharton soils are dominantly on hillsides. Latham and Steinsburg soils are on hillsides and ridgetops.

Typical pedon of Gilpin silt loam, in an area of the Latham-Gilpin association, hilly, about 2 miles north of South Webster; in Bloom Township; about 840 feet north and 1,800 feet west of the southeast corner of sec. 3, R. 19 W., T. 4 N.

A—0 to 5 inches; yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/4) dry; weak fine granular structure; friable; common fine and medium roots; about 3 percent coarse fragments; strongly acid; abrupt wavy boundary.

BE—5 to 12 inches; strong brown (7.5YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; common fine roots; common faint strong brown (7.5YR 5/6) and few distinct brown (7.5YR 5/4) silt coatings on faces of peds; brown (10YR 4/3) krotovinas; about 5 percent coarse fragments; strongly acid; clear wavy boundary.

Bt1—12 to 17 inches; strong brown (7.5YR 5/6) loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; few distinct yellowish brown (10YR 5/4) and brown (7.5YR 5/4) clay films on faces of peds; few faint strong brown (7.5YR 5/6) silt coatings on faces of peds; about 5 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt2—17 to 24 inches; strong brown (7.5YR 5/6) clay loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; few distinct brown (7.5YR 5/4) and light yellowish brown (10YR 6/4) clay films on faces of peds; few brown (7.5YR 5/4) silt coatings on faces of peds; few fine black (10YR 2/1) concretions and stains (iron and manganese oxides); about 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.

Bt3—24 to 28 inches; strong brown (7.5YR 5/6) clay loam; moderate fine and medium subangular blocky structure; friable; few fine roots; many distinct yellowish red (5YR 5/6) clay films on faces of peds; about 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.

R—28 to 30 inches; slightly weathered, strong brown (7.5YR 5/6) sandstone bedrock.

The thickness of the solum ranges from 24 to 36 inches. The depth to bedrock ranges from 24 to 40 inches. The bedrock is siltstone or sandstone.

The A horizon has value of 4 or 5 and chroma of 3 or 4. The BE horizon has hue of 7.5YR or 10YR and chroma of 4 to 8. It is silt loam or channery silt loam. The Bt horizon has hue or 7.5YR or 10YR. It is loam, silt loam, clay loam, or the channery analogs of these textures.

Haymond Series

The Haymond series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium derived dominantly from loess-covered uplands. Slope ranges from 0 to 3 percent.

Haymond soils are similar to Cuba, Genesee, Huntington, and Nolin soils and are commonly adjacent to Cuba, Stendal, and Tioga soils. Cuba, Genesee, Huntington, Nolin, and Stendal soils have more clay between depths of 10 and 40 inches than the Haymond soils. Tioga soils have more sand in the control section than the Haymond soils. Cuba and Tioga soils are in landscape positions similar to those of the Haymond soils. Stendal soils are in the slightly lower landscape positions.

Typical pedon of Haymond silt loam, occasionally flooded, in an area of Harrison Township about 1.5 miles east-southeast of Minford; about 400 feet west and 1,200 feet south of the northeast corner of sec. 3, T. 3 N., R. 20 W.

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

C1—9 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; common fine roots; thin strata of silt and very fine sand; brown (10YR 4/3) worm casts; few fine black (10YR 2/1) concretions (iron and manganese oxides); medium acid; clear wavy boundary.

C2—18 to 33 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; few fine roots; thin strata of silt and very fine sand; about 5 percent coarse fragments; slightly acid; clear wavy boundary.

C3—33 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; few fine roots; thin strata of silt and very fine sand; slightly acid; clear wavy boundary.

C4—45 to 57 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine roots; thin strata of silt and very fine sand; few fine black (10YR 2/1) concretions (iron and manganese oxides); medium acid; clear wavy boundary.

C5—57 to 78 inches; yellowish brown (10YR 5/4) loam; massive; friable; thin strata of silt and very fine sand; few fine black (10YR 2/1) concretions (iron and manganese oxides); medium acid.

The Ap and C horizons have chroma of 3 or 4. The C horizon is silt loam or loam in the upper part and silt loam, loam, or sandy loam in the lower part.

Huntington Series

The Huntington series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium. Slope ranges from 0 to 3 percent.

Huntington soils are similar to Cuba, Haymond, Nolin, and Rossburg soils and are commonly adjacent to Genesee, Landes, Nolin, and Rossburg soils. Cuba, Genesee, Haymond, and Nolin soils do not have a mollic epipedon. They are typically in the slightly lower positions on the flood plains. Landes and Rossburg soils have more sand in the subsoil than the Huntington soils. They are in landscape positions similar to those of the Huntington soils.

Typical pedon of Huntington silt loam, occasionally flooded, in an area of Valley Township about 5.25 miles north-northwest of Lucasville; about 1,400 feet north and 1,000 feet east of the southwest corner of sec. 1, T. 3 N., R. 22 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine and medium roots; neutral; clear smooth boundary.

A—7 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium and coarse granular structure; friable; few fine and medium roots; many distinct black (10YR 2/1) organic coatings on the vertical faces of peds; neutral; clear wavy boundary.

BA—12 to 19 inches; about 60 percent variegated brown (10YR 4/3) and 40 percent yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; few fine roots; many distinct black (10YR 2/1) and very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common distinct dark brown (10YR 3/3) silt coatings on faces of peds; neutral; clear wavy boundary.

Bw1—19 to 30 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) silt coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear wavy boundary.

Bw2—30 to 41 inches; yellowish brown (10YR 5/4) silt loam; weak fine and coarse subangular blocky structure; friable; few fine roots; many distinct brown (10YR 4/3) silt coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); few coarse fragments; neutral; clear wavy boundary.

C1—41 to 58 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few coarse fragments; neutral; clear wavy boundary.

C2—58 to 60 inches; yellowish brown (10YR 5/4) loam; massive; friable; neutral.

The thickness of the solum ranges from 40 to 70 inches. The soils typically have no coarse fragments. In some pedons, however, the content of these fragments is 1 to 3 percent in the B horizon.

The Ap horizon has chroma of 2 or 3. The Bw horizon has value of 4 or 5 and chroma of 3 or 4. It is silt loam or silty clay loam. The C horizon has value of 4 or 5. It is silt loam or loam.

Landes Series

The Landes series consists of deep, well drained, rapidly permeable soils on slope breaks between flood plains and low terraces. These soils formed in loamy and sandy alluvium. Slope ranges from 1 to 7 percent.

Landes soils are commonly adjacent to Genesee, Huntington, Nolin, and Rossburg soils. Genesee and Nolin soils do not have a mollic epipedon. They are on flood plains. Huntington and Rossburg soils have more clay in the subsoil than the Landes soils. They are in landscape positions similar to those of the Landes soils.

Typical pedon of Landes fine sandy loam, occasionally flooded, in an area of Valley Township about 2.5 miles north-northwest of Lucasville; about 156 feet south and 990 feet west of the northeast corner of sec. 7, T. 3 N., R. 22 W.

Ap1—0 to 6 inches; dark brown (10YR 3/3) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common fine and medium roots; very dark grayish brown (10YR 3/2) worm casts; about 5 percent coarse fragments; neutral; clear wavy boundary.

Ap2—6 to 11 inches; dark brown (10YR 3/3) fine sandy loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure; friable; common fine and medium roots; very dark grayish brown (10YR 3/2) worm casts; many distinct very dark grayish brown (10YR 3/2) silt coatings on faces of peds; about 5 percent coarse fragments; neutral; clear smooth boundary.

Bw—11 to 22 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; very dark grayish brown (10YR 3/2) worm casts; black (10YR 2/1) organic stains on faces of peds; neutral; clear wavy boundary.

C1—22 to 39 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; very friable; few fine roots; slight effervescence in the lower part; mildly alkaline; clear wavy boundary.

C2—39 to 46 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; very friable; strong effervescence; mildly alkaline; clear wavy boundary.

C3—46 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; single grained; very friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The Ap horizon is typically fine sandy loam but is silt loam or loam in some pedons. The B horizon has value of 3 to 5. The C horizon has value of 4 or 5 and chroma of 3 or 4. It is fine sandy loam, loamy fine sand, or loamy sand.

Latham Series

The Latham series consists of moderately deep, moderately well drained, slowly permeable soils on ridgetops, side slopes, and foot slopes in the uplands. These soils formed in shale and siltstone residuum. Slope ranges from 8 to 40 percent.

Latham soils are similar to Rarden soils and are commonly adjacent to Brownsville, Gilpin, Shelocta, Steinsburg, and Wharton soils. Rarden soils are redder in the subsoil than the Latham soils. Brownsville, Shelocta, and Wharton soils are deep over bedrock. Gilpin and Steinsburg soils have less clay in the subsoil than the Latham soils. Brownsville, Shelocta, and Wharton soils are on hillsides. Gilpin soils are on ridgetops and shoulder slopes. Steinsburg soils are on shoulder slopes and the upper parts of side slopes.

Typical pedon of Latham silt loam, in an area of the Latham-Gilpin association, hilly, about 1 mile northeast of Henley; in Union Township; about 760 feet south of the intersection of Henley-Comstock Road and Diehlman Road, along Henley-Comstock Road, then 3,400 feet east:

A—0 to 3 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine and medium roots; few black (10YR 2/1) organic stains; about 10 percent coarse fragments; medium acid; clear smooth boundary.

BE—3 to 8 inches; yellowish brown (10YR 5/4) channery silt loam; moderate fine and medium subangular blocky structure; firm; common fine roots; common distinct brown (10YR 5/3) silt coatings on faces of peds; brown (10YR 4/3) fillings in worm channels and pores; few fine black (10YR 2/1) concretions (iron and manganese oxides); about 20 percent coarse fragments; strongly acid; clear smooth boundary.

Bt1—8 to 18 inches; strong brown (7.5YR 5/6) silty clay loam; strong fine and medium subangular blocky structure; firm; few fine roots; many prominent yellowish red (5YR 5/8) clay films on faces of peds; common distinct yellowish brown (10YR 5/6) silt coatings on faces of peds; few fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 5 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt2—18 to 24 inches; strong brown (7.5YR 5/6) silty clay; common medium distinct yellowish red (5YR 4/6) and few fine prominent grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure parting to strong fine angular blocky; firm; few fine roots; many faint strong brown (7.5YR 5/6) and many prominent yellowish red (5YR 4/6 and 5/8) clay films on faces of peds; about 5 percent coarse fragments; very strongly acid; clear smooth boundary.

Bt3—24 to 33 inches; strong brown (7.5YR 5/8) silty clay; common medium prominent gray (N 6/0) mottles; strong medium and coarse angular blocky structure parting to strong fine angular blocky; firm; few fine roots; many prominent gray (N 6/0) and many distinct brown (7.5YR 5/4) and reddish brown (5YR 4/4) clay films on faces of peds; about 5 percent coarse fragments; very strongly acid; clear smooth boundary.

Cr—33 to 40 inches; yellowish brown (10YR 5/4) weathered, soft, thinly bedded siltstone bedrock.

The thickness of the solum and the depth to paralithic contact range from 20 to 40 inches. The BE horizon has hue of 7.5YR or 10YR and value of 4 or 5. It is silt loam or channery silt loam. The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 8. It is silty clay loam, silty clay, channery silty clay loam, or shaly silty clay loam. The Cr horizon has hue of 7.5YR to 2.5Y. It is siltstone or shale.

Monongahela Series

The Monongahela series consists of deep, moderately well drained soils in preglacial valleys. These soils formed in colluvium or old alluvium. They have a fragipan. Permeability is moderate above the fragipan and slow or moderately slow in the fragipan. Slope ranges from 1 to 15 percent.

Monongahela soils are similar to Omulga, Sciotoville, and Tilsit soils and are commonly adjacent to Ernest, Omulga, and Wyatt soils. Ernest soils are on colluvial foot slopes and toe slopes. They have a higher content of angular coarse fragments in the subsoil than the Monongahela soils. Omulga, Sciotoville, Tilsit, and Wyatt soils have less sand and fewer coarse fragments in the subsoil than the Monongahela soils. Omulga and Wyatt soils are in landscape positions similar to those of the Monongahela soils.

Typical pedon of Monongahela silt loam, 8 to 15 percent slopes, eroded, in an area of Madison Township about 1 mile northeast of Muletown; about 1,000 feet north and 675 feet east of the southwest corner of sec. 27, T. 4 N., R. 20 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; common roots; few fine black (10YR 2/1) concretions (iron and manganese oxides); about 5 percent coarse fragments; medium acid; clear smooth boundary.

Bt1—6 to 13 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few roots; few distinct brown (7.5YR 5/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; brown (10YR 4/3) worm casts; few fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 5 percent coarse fragments; medium acid; clear wavy boundary.

Bt2—13 to 18 inches; yellowish brown (10YR 5/6) loam; few medium distinct pale brown (10YR 6/3) mottles; weak medium angular and subangular blocky structure; friable; few roots; few distinct brown (7.5YR 5/4) clay films on faces of peds; few faint yellowish brown (10YR 5/6) silt coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); about 5 percent coarse fragments; strongly acid; abrupt wavy boundary.

Btx1—18 to 28 inches; yellowish brown (10YR 5/6) loam; few fine distinct pale brown (10YR 6/3) mottles; weak very coarse prismatic structure parting to moderate thick platy; very firm; brittle; few distinct brown (7.5YR 5/4) clay films on faces of peds; common fine and medium black (10YR 2/1) concretions (iron and manganese oxides); about 10 percent coarse fragments; very strongly acid; clear wavy boundary.

Btx2—28 to 36 inches; strong brown (7.5YR 5/6) loam; few fine prominent light gray (10YR 7/2) and common medium distinct brown (7.5YR 5/4) mottles; weak very coarse prismatic structure parting to moderate medium platy; very firm; brittle; few distinct brown (7.5YR 5/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/6) silt coatings on faces of peds; common fine and medium black (10YR 2/1) concretions (iron and manganese oxides); about 5 percent coarse fragments; very strongly acid; clear wavy boundary.

Btx3—36 to 43 inches; brown (7.5YR 5/4) sandy clay loam; few medium distinct reddish brown (5YR 5/4) and common medium prominent yellowish brown (10YR 5/6) mottles; weak very coarse prismatic structure parting to moderate thick platy; very firm; brittle; many faint brown (7.5YR 5/4) clay films on horizontal faces of peds; common black (10YR 2/1) concretions (iron and manganese oxides); about 5 percent coarse fragments; very strongly acid; clear wavy boundary.

Btx4—43 to 57 inches; strong brown (7.5YR 5/6) sandy clay loam; many medium prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; very firm and brittle in less than 60 percent of the horizon; many distinct brown (7.5YR 5/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

BC—57 to 70 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; firm; very strongly acid.

The solum is 60 to 72 inches thick. The depth to the top of the fragipan is 18 to 30 inches.

The Ap horizon is typically silt loam but is loam in some pedons. The Bt horizon has hue of 10YR or 7.5YR and value of 5 or 6. The Btx horizon has chroma of 4 to 6. It is loam, clay loam, or sandy clay loam. The BC horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 6. It is silty clay loam, sandy loam, or sandy clay loam.

Nolin Series

The Nolin series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium. Slope ranges from 0 to 3 percent.

Nolin soils are similar to Cuba, Haymond, and Huntington soils and are commonly adjacent to Genesee, Huntington, Landes, and Rossburg soils. Cuba soils are more acid throughout than the Nolin soils. Genesee soils have more sand in the subsoil than the Nolin soils. They are in landscape positions similar to those of the Nolin soils. Haymond soils have less clay between depths of 10 and 40 inches than the Nolin soils. Huntington, Landes, and Rossburg soils have a mollic epipedon. They are in the slightly higher landscape positions.

Typical pedon of Nolin silt loam, occasionally flooded, in an area of Valley Township about 1.25 miles south of Lucasville; about 2,000 feet south and 450 feet west of the northeast corner of sec. 6, T. 2 N., R. 21 W.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; moderate medium and fine subangular blocky structure parting to moderate fine granular; friable; few roots; few faint dark grayish brown (10YR 4/2) silt coatings on faces of peds; neutral; abrupt smooth boundary.

Bw1—11 to 29 inches; brown (10YR 4/3) silty clay loam; moderate medium and fine subangular blocky structure; firm; few roots; few dark yellowish brown (10YR 4/4) variegations; few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; neutral; clear smooth boundary.

Bw2—29 to 48 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and fine subangular blocky structure; firm; few roots; few brown (10YR 4/3) variegations; few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; neutral; clear smooth boundary.

Bw3—48 to 57 inches; brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; common dark yellowish brown (10YR 4/4) variegations; few faint brown (10YR 4/3) silt coatings on faces of peds; mildly alkaline; abrupt smooth boundary.

C—57 to 66 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and few fine faint yellowish brown (10YR 5/6) mottles; massive; friable; few distinct dark grayish brown (10YR 4/2) silt coatings on faces of peds; slight effervescense; mildly alkaline.

The thickness of the solum ranges from 40 to 58 inches. The Ap horizon has chroma of 2 or 3. It is dominantly silt loam but is silty clay loam in some pedons. The B horizon has chroma of 3 or 4. It is silty clay loam or silt loam. The C horizon has value of 4 or 5 and chroma of 2 to 4. It is silt loam or loam.

Ockley Series

The Ockley series consists of deep, well drained soils on terraces. These soils formed in glacial outwash. Permeability is moderate in the solum and very rapid in the substratum. Slope ranges from 1 to 8 percent.

Ockley soils are similar to Wheeling soils and are commonly adjacent to Casco, Fitchville, and Sardinia soils. Casco soils are on very steep slope breaks. They have a solum that is thinner than that of the Ockley soils. Fitchville and Sardinia soils have less sand in the solum than the Ockley soils. Fitchville soils are in the lower landscape positions and along drainageways. Sardinia soils are in the slightly lower landscape positions. Wheeling soils are more acid in the substratum than the Ockley soils.

Typical pedon of Ockley loam, 1 to 8 percent slopes, in an area of Valley Township about 2.5 miles south of Lucasville; about 2,000 feet north and 1,900 feet west of the southeast corner of sec. 8, T. 2 N., R. 21 W.

Ap—0 to 10 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; common roots; about 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

BE—10 to 15 inches; yellowish brown (10YR 5/6) loam; moderate medium and fine subangular blocky structure; friable; few roots; few prominent brown (10YR 4/3) silt coatings on faces of peds; brown (10YR 4/3) worm casts; about 5 percent coarse fragments; medium acid; clear wavy boundary.

Bt1—15 to 27 inches; strong brown (7.5YR 5.6) clay loam; moderate medium subangular blocky structure; friable; few roots; few prominent brown (10YR 4/3) clay films on faces of peds; few faint strong brown (7.5YR 5/6) silt coatings on faces of peds; about 10 percent coarse fragments; medium acid; clear wavy boundary.

Bt2—27 to 37 inches; brown (7.5YR 4/4) gravelly clay loam; moderate medium and fine subangular blocky structure; friable; many faint brown (7.5YR 4/4) clay films bridging sand grains; few fine black (10YR 2/1) stains (iron and manganese oxides); about 25 percent coarse fragments; medium acid; clear wavy boundary.

Bt3—37 to 51 inches; brown (7.5YR 4/4) gravelly sandy clay loam; weak fine subangular blocky structure; friable; few faint brown (7.5YR 4/4) clay films bridging sand grains; few fine black (10YR 2/1) stains (iron and manganese oxides); about 30 percent coarse fragments; neutral; gradual wavy boundary.

C—51 to 74 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand; single grained; friable; very few distinct brown (7.5YR 4/4) clay films bridging sand grains; about 40 percent coarse fragments; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 40 to 72 inches. The content of coarse fragments ranges from 0 to 15 percent in the upper part of the solum and from 15 to 40 percent in the lower part.

The Ap horizon is typically loam but is silt loam in some pedons. The Bt horizon has hue of 10YR or 7.5YR and chroma of 3 to 6. It is clay loam, sandy clay loam, or the gravelly or very gravelly analogs of these textures. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is very gravelly loamy coarse sand, gravelly coarse sand, or very gravelly coarse sand.

Omulga Series

The Omulga series consists of deep, moderately well drained soils in preglacial valleys. These soils formed in loess, colluvium, or old alluvium and in the underlying lacustrine sediments. They have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. Slope ranges from 1 to 15 percent.

Omulga soils are similar to Monongahela, Sciotoville, and Tilsit soils and are commonly adjacent to Doles, Ernest, Monongahela, and Wyatt soils. The somewhat poorly drained Doles soils are in the lower landscape positions. Ernest and Monongahela soils have more sand in the upper part of the subsoil than the Omulga soils. Ernest soils are on colluvial foot slopes and toe slopes. Monongahela and Wyatt soils are in landscape positions similar to those of the Omulga soils. Wyatt soils have more clay in the upper part of the subsoil than the Omulga soils. Sciotoville soils have mottles with low chroma in the upper 10 inches of the argillic horizon. Tilsit soils have a base saturation that is lower than that of the Omulga soils.

Typical pedon of Omulga silt loam, 1 to 8 percent slopes, in an area of Madison Township about 3.75 miles north-northwest of Muletown; about 1,930 feet west and 890 feet south of the northeast corner of sec. 17, T. 4 N., R. 20 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak medium granular structure; friable; many fine roots; common black (10YR 2/1) concretions (iron and manganese oxides); about 1 percent coarse fragments; medium acid; abrupt smooth boundary.

Bt1—10 to 15 inches; yellowish brown (10YR 5/6) silt loam; weak coarse subangular blocky structure; friable; common fine roots; few distinct yellowish brown (10YR 5/4) clay films on faces of peds; common distinct brownish yellow (10YR 6/6) silt coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); about 1 percent coarse fragments; strongly acid; gradual wavy boundary.

Bt2—15 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; few faint yellowish brown (10YR 5/6) clay films on faces of peds; common distinct light yellowish brown (10YR 6/4) silt coatings on faces of peds; few fine black (10YR 2/1) concretions (iron and manganese oxides); about 1 percent coarse fragments; very strongly acid; clear smooth boundary.

Bt3—20 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; few fine prominent light brownish gray (2.5Y 6/2) and few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; few faint yellowish brown (10YR 5/6) clay films on faces of peds; many distinct light yellowish brown (10YR 6/4) silt coatings on faces of peds; about 1 percent coarse fragments; very strongly acid; clear smooth boundary.

Bt4—24 to 30 inches; yellowish brown (10YR 5/6) silty clay loam; few coarse faint yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm; few fine roots; many prominent grayish brown (10YR 5/2) clay films on vertical faces of peds and many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; many distinct pale brown (10YR 6/3) silt coatings on faces of peds; about 2 percent coarse fragments; very strongly acid; clear wavy boundary.

Btx—30 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very coarse prismatic structure parting to weak medium subangular blocky; very firm; brittle; few fine roots; many distinct grayish brown (10YR 5/2) clay films on vertical faces of peds and common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; about 2 percent coarse fragments; very strongly acid; clear wavy boundary.

2Bt1—43 to 50 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles; moderate coarse subangular blocky structure; friable; common prominent light brownish gray (2.5Y 6/2) clay films on vertical faces of peds and many distinct light yellowish brown (10YR 6/4) clay films on faces of peds; about 2 percent coarse fragments; very strongly acid; clear wavy boundary.

2Bt2—50 to 62 inches; yellowish brown (10YR 5/6) silty clay; moderate coarse angular blocky structure; firm; many prominent light brownish gray (2.5Y 6/2) clay films on vertical faces of peds and common distinct light yellowish brown (10YR 6/4) and common prominent yellowish red (5YR 5/6) clay films on faces of peds; about 1 percent coarse fragments; very strongly acid; gradual wavy boundary.

2Bt3—62 to 79 inches; yellowish brown (10YR 5/6) clay; weak medium subangular blocky structure; firm; many prominent light brownish gray (2.5Y 6/2) and common distinct light yellowish brown (10YR 6/4) and yellowish red (5YR 4/6) clay films on faces of peds; about 2 percent coarse fragments; very strongly acid; gradual wavy boundary.

2C—79 to 85 inches; brown (7.5YR 5/2) clay; massive; very firm; gray (5Y 6/1), very thin horizontal bands in the matrix; strongly acid.

The thickness of the solum ranges from 40 to 100 inches. The depth to the top of the fragipan ranges from 18 to 36 inches.

The Ap horizon has chroma of 2 or 3. The Bt and Btx horizons are silt loam or silty clay loam. The Bt horizon has chroma of 4 to 6. The Btx and 2Bt horizons have hue of 10YR or 7.5YR and chroma of 4 to 6. The 2Bt horizon is silty clay loam, silty clay, or clay. The 2C horizon has hue of 10YR or 7.5YR and chroma of 2 to 6. It is silty clay loam, silty clay, clay, clay loam, loam, or sandy clay loam.

Peoga Series

The Peoga series consists of deep, poorly drained, slowly permeable soils on flats and in depressions on terraces. These soils formed in old alluvium. Slope is 0 to 2 percent.

Peoga soils are commonly adjacent to Fitchville, Sardinia, Sciotoville, and Weinbach soils in the slightly higher landscape positions. Fitchville and Weinbach soils are somewhat poorly drained. Sardinia and Sciotoville soils are moderately well drained.

Typical pedon of Peoga silt loam, rarely flooded, in an area of Green Township about 0.75 mile north-northeast of Haverhill; about 4,000 feet northwest of the junction of Gallia Pike and Haverhill-Ohio Furnace Road, along Gallia Pike, then 3,300 feet east:

Ap1—0 to 7 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; weak medium and fine granular structure; friable; few roots; medium acid; clear smooth boundary.

Ap2—7 to 13 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; weak medium and fine subangular blocky structure; friable; few roots; many distinct dark gray (10YR 4/1) silt coatings on faces of peds; medium acid; abrupt smooth boundary.

Eg—13 to 15 inches; gray (10YR 5/1) silt loam; few fine faint dark gray (10YR 4/1), few fine distinct brown (10YR 5/3), and few fine prominent dark brown (7.5YR 4/4) mottles; weak medium and fine subangular blocky structure; friable; few roots; common faint gray (10YR 5/1) silt coatings on faces of peds; few fine dark brown (7.5YR 3/2) concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

Btg1—15 to 35 inches; gray (10YR 6/1) silt loam; common fine prominent yellowish brown (10YR 5/6), common medium faint gray (10YR 5/1), and few fine and medium distinct dark gray (10YR 4/1) mottles; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; few roots; few faint gray (10YR 5/1) clay films on faces of peds; few fine dark brown (7.5YR 3/2) concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

Btg2—35 to 42 inches; gray (10YR 6/1) silt loam; common medium prominent yellowish brown (10YR 5/6) and few fine faint light gray (10YR 7/1) mottles; moderate coarse prismatic structure parting to moderate medium and fine subangular blocky; firm; common faint gray (10YR 5/1 and 6/1) clay films on faces of peds; few medium very dark gray (N 3/0) concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

BCg—42 to 49 inches; gray (10YR 6/1) silt loam; many medium prominent strong brown (7.5YR 5/6), common fine distinct white (10YR 8/2), and common medium distinct dark grayish brown (10YR 4/2) mottles; weak coarse prismatic structure; firm; few medium very dark gray (N 3/0) concretions (iron and manganese oxides); strongly acid; abrupt smooth boundary.

Cg—49 to 82 inches; gray (10YR 5/1) silt loam; common medium prominent dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) mottles; massive; firm; common medium dark reddish brown (5YR 3/3) concretions (iron and manganese oxides); strongly acid.

The thickness of the solum ranges from 48 to 72 inches. The Ap horizon has value of 4 or 5 and chroma of 1 or 2. The Bt horizon has value of 5 to 7 and chroma of 1 or 2. It is silt loam or silty clay loam. The C horizon is loam or silt loam.

Piopolis Series

The Piopolis series consists of deep, poorly drained and very poorly drained, slowly permeable soils in depressions on flood plains. These soils formed in silty alluvium. Slope is 0 to 1 percent.

Piopolis soils are commonly adjacent to Cuba, Haymond, Stendal, and Tioga soils in the slightly higher positions on the flood plains. Cuba, Haymond, and Tioga soils are well drained. Stendal soils are somewhat poorly drained.

Typical pedon of Piopolis silt loam, ponded, in an area of Bloom Township about 1.75 miles east-southeast of South Webster; about 100 feet north and 1,000 feet west of the southeast corner of sec. 13, T. 4 N., R. 19 W.

A—0 to 5 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; weak fine granular structure; friable; many roots; few fine very dark grayish brown (10YR 3/2) concretions and stains (iron and manganese oxides); about 5 percent coarse fragments; medium acid; clear wavy boundary.

Cg1—5 to 12 inches; light brownish gray (2.5Y 6/2) silty clay loam; weak medium subangular blocky structure; friable; common roots; many silt coatings on faces of peds; common fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) concretions and stains (iron and manganese oxides); about 5 percent coarse fragments; medium acid; clear wavy boundary.

Cg2—12 to 23 inches; gray (N 5/0) silty clay loam; common medium prominent light brown (7.5YR 6/4) mottles; moderate medium and coarse subangular blocky structure; friable; few roots; many faint light gray (10YR 6/1) silt coatings on faces of peds; common fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) concretions and stains (iron and manganese oxides); about 5 percent coarse fragments; strongly acid; clear wavy boundary.

Cg3—23 to 31 inches; gray (N 5/0) silty clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; moderate medium and coarse subangular blocky structure; friable; few roots; many faint light gray (10YR 6/1) silt coatings on faces of peds; many fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) concretions and stains (iron and manganese oxides); strongly acid; clear wavy boundary.

Cg4—31 to 47 inches; light gray (10YR 6/1) silty clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; moderate medium and coarse subangular blocky structure; friable; many faint light gray (10YR 6/1) silt coatings on faces of peds; many fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); strongly acid; clear wavy boundary.

Cg5—47 to 60 inches; light gray (10YR 6/1) silty clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; massive; friable; few fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); strongly acid.

The A horizon has hue of 2.5Y or 10YR and chroma of 1 or 2. The Cg horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 5 or 6 and chroma of 0 to 2. It is typically silty clay loam, but it has strata of silt loam in some pedons.

Rarden Series

The Rarden series consists of moderately deep, moderately well drained, slowly permeable soils on shoulder slopes and ridgetops in the uplands. These soils formed in material weathered from shale that has thin beds of siltstone. Slope ranges from 8 to 15 percent.

Rarden soils are similar to Latham soils and are commonly adjacent to Coolville soils. Coolville soils are deep over bedrock and have more silt in the upper part than the Rarden soils. They are in the middle of the ridgetops. Latham soils are not so red in the subsoil as the Rarden soils.

Typical pedon of Rarden silt loam, in an area of Coolville-Rarden silt loams, 8 to 15 percent slopes, about 2.8 miles northeast of Rarden; in Rarden Township; about 2,500 feet east of the intersection of State Route 772 and Rarden-Bear Creek Road, along Rarden-Bear Creek Road, then 4,320 feet south:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; few fine roots; few fine black (10YR 2/1) concretions (iron and manganese oxides); about 10 percent yellowish red (5YR 5/6) subsoil material; about 10 percent coarse fragments; strongly acid; abrupt smooth boundary.

Bt1—8 to 14 inches; yellowish red (5YR 5/6) silty clay; few fine distinct red (2.5YR 4/6) and few fine prominent brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; few fine roots; common faint yellowish red (5YR 5/6) clay films on faces of peds; common distinct strong brown (7.5YR 5/6) silt coatings on faces of peds; about 5 percent coarse fragments; strongly acid; clear smooth boundary.

Bt2—14 to 23 inches; yellowish red (5YR 5/6) silty clay; common medium prominent red (2.5YR 4/6) and common medium prominent gray (5YR 6/1) mottles; weak fine and medium subangular blocky structure; firm; few fine roots; many prominent gray (5YR 6/1) and faint yellowish red (5YR 5/6) clay films on faces of peds; few distinct red (2.5YR 4/6) silt coatings on faces of peds; brown (10YR 5/3) worm casts; about 10 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt3—23 to 28 inches; yellowish red (5YR 5/6) channery silty clay; common medium prominent light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm; few roots; common faint yellowish red (5YR 5/6) and common prominent gray (N 5/0) clay films on faces of peds; about 20 percent coarse fragments; very strongly acid; clear wavy boundary.

BC—28 to 32 inches; yellowish red (5YR 5/6) channery silty clay; common medium prominent light gray (10YR 7/1) mottles; weak medium subangular blocky structure; firm; few fine roots; about 20 percent coarse fragments; very strongly acid; clear smooth boundary.

Cr—32 to 35 inches; yellowish brown (10YR 5/6), soft, interbedded shale and siltstone bedrock.

The thickness of the solum and the depth to paralithic contact range from 20 to 40 inches. The Ap horizon has chroma of 2 or 3. It is typically silt loam but is silty clay loam in some pedons. The Bt horizon typically has hue of 5YR, but thin subhorizons have hue of 7.5YR or 10YR in some pedons. This horizon has value and chroma of 4 to 6. It is silty clay, channery silty clay, or clay. The BC horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 6.

Rossburg Series

The Rossburg series consists of deep, well drained soils on flood plains. These soils formed in alluvium. Permeability is moderate in the solum and moderately rapid or rapid in the substratum. Slope ranges from 0 to 3 percent.

Rossburg soils are similar to Genesee and Huntington soils and are commonly adjacent to Genesee, Huntington, Landes, and Nolin soils. Genesee and Nolin soils do not have a mollic epipedon. They are in the slightly lower positions on the flood plains. Huntington and Nolin soils have less sand in the subsoil than the Rossburg soils, and Landes soils have less clay in the subsoil. Huntington and Landes soils are in landscape positions similar to those of the Rossburg soils.

Typical pedon of Rossburg silty clay loam, occasionally flooded, in an area of Valley Township about 1.5 miles south of Lucasville; about 760 feet west and 3,200 feet south of the northeast corner of sec. 6, T. 2 N., R. 21 W.

Ap—0 to 12 inches; dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; mildly alkaline; abrupt smooth boundary.

A—12 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam; weak fine and medium subangular blocky structure; friable; few fine roots; mildly alkaline; clear smooth boundary.

Bw1—15 to 21 inches; dark brown (10YR 3/3) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; few dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) variegations; very dark grayish brown (10YR 3/2) organic stains; mildly alkaline; clear smooth boundary.

Bw2—21 to 27 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; few fine roots; few yellowish brown (10YR 5/6) variegations; dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) organic stains on faces of peds; mildly alkaline; clear smooth boundary.

Bw3—27 to 32 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; few yellowish brown (10YR 5/6) variegations; brown (10YR 4/3) organic stains on faces of peds; mildly alkaline; clear smooth boundary.

Bw4—32 to 44 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; mildly alkaline; abrupt smooth boundary.

2C1—44 to 47 inches; yellowish brown (10YR 5/4) loamy sand; massive; very friable; mildly alkaline; abrupt smooth boundary.

2C2—47 to 58 inches; yellowish brown (10YR 5/6) loamy sand; massive; very friable; about 2 percent coarse fragments; slight effervescence; mildly alkaline; abrupt smooth boundary.

2C3—58 to 80 inches; yellowish brown (10YR 5/4) stratified loamy sand and sand; single grained; loose; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 24 to 60 inches. The mollic epipedon is 14 to 24 inches thick.

The A horizon has value of 2 or 3. It is dominantly silty clay loam but is loam or silt loam in some pedons. The B horizon has hue of 7.5YR or 10YR and chroma of 3 to 6. It is commonly silt loam or loam but in some pedons is sandy loam in the lower part. The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loamy sand, sand, or gravelly sand.

Sardinia Series

The Sardinia series consists of deep, moderately well drained soils on terraces. These soils formed in old alluvium. Permeability is moderate or moderately slow. Slope ranges from 1 to 8 percent.

Sardinia soils are similar to Elkinsville soils and are commonly adjacent to Elkinsville, Fitchville, Ockley, Peoga, and Wheeling soils. The well drained Elkinsville, Ockley, and Wheeling soils are in landscape positions similar to those of the Sardinia soils. The somewhat poorly drained Fitchville soils are in the slightly lower positions. The poorly drained Peoga soils are in depressions and along drainageways.

Typical pedon of Sardinia silt loam, 1 to 8 percent slopes, in an area of Nile Township, 0.8 mile east of Friendship; about 2,280 feet southeast of the intersection of U.S. Highway 52 and Drews Lane, along Drews Lane, then 880 feet east:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; common roots; brown (10YR 4/3) worm casts; about 3 percent coarse fragments; slightly acid; abrupt smooth boundary.

Bt1—10 to 14 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common roots; few distinct brown (10YR 5/3) clay films on faces of peds; few distinct brown (10YR 4/3) silt coatings on faces of peds; brown (10YR 4/3) worm casts; common fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); slightly acid; clear wavy boundary.

Bt2—14 to 22 inches; dark yellowish brown (10YR 4/4) silt loam; common medium prominent strong brown (7.5YR 5/6) and few medium faint brown (10YR 5/3) mottles; few fine distinct grayish brown (10YR 5/2) mottles in the lower part; moderate medium subangular blocky structure; firm; common roots; common distinct brown (7.5YR 5/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; brown (7.5YR 5/4) worm casts; common fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 1 percent coarse fragments; medium acid; clear wavy boundary.

Bt3—22 to 37 inches; dark yellowish brown (10YR 4/4) silt loam; common medium prominent strong brown (7.5YR 5/6) and few medium distinct grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; few distinct brown (10YR 5/3) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; brown (10YR 5/3) worm casts; common fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 2 percent coarse fragments; medium acid; clear wavy boundary.

Bt4—37 to 60 inches; dark yellowish brown (10YR 4/4) silt loam; common medium distinct light brownish gray (10YR 6/2) and brown (7.5YR 5/4) mottles; weak medium prismatic structure parting to weak thick platy; firm; common distinct brown (10YR 5/3) clay films on faces of peds; common fine and medium very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); strongly acid; abrupt wavy boundary.

BC—60 to 75 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; few fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); strongly acid; abrupt wavy boundary.

C—75 to 80 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; massive; friable; common fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); medium acid.

The thickness of the solum ranges from 60 to 90 inches. The content of coarse fragments ranges from 0 to 5 percent throughout the profile.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. The C horizon has chroma of 4 to 6. It is dominantly silt loam or silty clay loam, but in some pedons it has strata of loam or fine sandy loam.

Sciotoville Series

The Sciotoville series consists of deep, moderately well drained soils on broad terraces. These soils formed in old alluvium. They have a fragipan. Permeability is moderate above the fragipan and slow or moderately slow in the fragipan. Slope ranges from 1 to 8 percent.

Sciotoville soils are similar to Monongahela, Omulga, and Tilsit soils and are commonly adjacent to Elkinsville, Weinbach, and Wheeling soils. Monongahela, Omulga, and Tilsit soils do not have mottles with low chroma in the upper 10 inches of the argillic horizon. The well drained Elkinsville and Wheeling soils are in landscape positions similar to those of the Sciotoville soils. The somewhat poorly drained Weinbach soils are in the slightly lower positions.

Typical pedon of Sciotoville silt loam, 1 to 8 percent slopes, in an area of Green Township about 1 mile northwest of Haverhill; about 5,150 feet northwest of the intersection of Gallia Pike and Haverhill-Ohio Furnace Road, along Gallia Pike, then 1,600 feet west:

Ap1—0 to 8 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak fine and medium granular structure; friable; few roots; few fine specks of brown (10YR 5/3) subsoil material; few fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

Ap2—8 to 13 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium subangular blocky structure; firm; few roots; few fine distinct specks of yellowish brown (10YR 5/4) subsoil material; few fine dark concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

Bt1—13 to 22 inches; yellowish brown (10YR 5/4) silt loam; common medium prominent strong brown (7.5YR 5/6) and common fine faint brown (10YR 5/3) mottles; moderate fine and medium subangular blocky structure; friable; few roots; common faint grayish brown (10YR 5/2) clay films on faces of peds; many faint brown (10YR 5/3) silt coatings on faces of peds; common fine dark concretions (iron and manganese oxides); few fine mica flakes; strongly acid; clear smooth boundary.

Bt2—22 to 34 inches; brown (10YR 5/3) silt loam; common medium faint grayish brown (10YR 5/2) and common medium prominent yellowish red (5YR 5/8) mottles; moderate fine and medium subangular blocky structure; friable; few roots; common faint brown (10YR 5/3) clay films and silt coatings on faces of peds; common fine dark concretions (iron and manganese oxides); few fine mica flakes; strongly acid; abrupt wavy boundary.

Btx1—34 to 46 inches; brown (7.5YR 4/4) silt loam; common medium faint brown (7.5YR 5/2) and common medium distinct yellowish red (5YR 4/6) mottles; weak very coarse prismatic structure parting to moderate medium platy; very firm; brittle; many distinct brown (10YR 4/3) clay films on faces of peds; many fine and medium dark concretions (iron and manganese oxides); common fine mica flakes; strongly acid; clear smooth boundary.

Btx2—46 to 59 inches; brown (7.5YR 4/4) silt loam; common fine prominent yellowish red (5YR 4/6) and common medium distinct brown (7.5YR 5/2) and yellowish brown (10YR 5/4) mottles; weak very coarse prismatic structure parting to moderate medium platy and subangular blocky; very firm; brittle; many distinct brown (10YR 4/3) clay films on faces of peds; many fine and medium dark concretions (iron and manganese oxides); common fine mica flakes; strongly acid; clear smooth boundary.

C—59 to 69 inches; brown (10YR 5/3) silt loam; common fine prominent strong brown (7.5YR 5/6) and common fine faint grayish brown (10YR 5/2) mottles; massive; friable; few fine dark concretions (iron and manganese oxides); common fine mica flakes; strongly acid.

The thickness of the solum ranges from 45 to 80 inches. The depth to the top of the fragipan ranges from 24 to 38 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has chroma of 3 to 6. The Btx horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or loam. The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4.

Shelocta Series

The Shelocta series consists of deep, well drained, moderately permeable soils on side slopes, foot slopes, and fans in the uplands. These soils formed in colluvium over siltstone and sandstone residuum. Slope ranges from 3 to 60 percent.

Shelocta soils are similar to Gilpin and Wharton soils and are commonly adjacent to Brownsville, Ernest, Latham, Steinsburg, and Wharton soils. Brownsville soils have a higher content of coarse fragments in the subsoil than the Shelocta soils. Ernest, Latham, and Wharton soils are moderately well drained. Brownsville, Latham, and Wharton soils are in landscape positions similar to those of the Shelocta soils. Latham soils also are on ridgetops. Ernest soils are on foot slopes. Gilpin soils are moderately deep over bedrock. Steinsburg soils have less clay in the subsoil than the Shelocta soils. They are on ridgetops and the upper parts of side slopes.

Typical pedon of Shelocta silt loam, in an area of the Shelocta-Brownsville association, very steep, about 4.1 miles west of Friendship; in Nile Township; about 9,240 feet southwest of the intersection of State Route 125 and Pond Lick Road, along Pond Lick Road, then 600 feet south:

Oe—1 inch to 0; partially decomposed leaf litter.

A1—0 to 3; very dark grayish brown (10YR 3/2) silt loam, very pale brown (10YR 7/4) dry; moderate medium granular structure; friable; many roots; about 5 percent coarse fragments; strongly acid; abrupt wavy boundary.

A2—3 to 6 inches; dark grayish brown (10YR 4/2) silt loam, very pale brown (10YR 7/4) dry; moderate coarse granular structure; friable; many roots; about 5 percent coarse fragments; strongly acid; abrupt wavy boundary.

E—6 to 9 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; common roots; about 5 percent coarse fragments; very strongly acid; clear wavy boundary.

BE—9 to 13 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common roots; few distinct brown (10YR 5/3) silt coatings on faces of peds; about 10 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt1—13 to 19 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; common roots; few distinct brown (7.5YR 4/4) clay films on faces of peds; common distinct yellowish brown (10YR 5/6) silt coatings on faces of peds; about 10 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt2—19 to 25 inches; brown (7.5YR 4/4) channery silt loam; moderate medium subangular blocky structure; firm; common roots; common distinct brown (7.5YR 5/4) clay films on faces of peds; common distinct yellowish brown (10YR 5/6) silt coatings on faces of peds; about 20 percent coarse fragments; very strongly acid; clear wavy boundary.

Bt3—25 to 31 inches; brown (7.5YR 5/4) very channery silt loam; moderate medium subangular blocky structure; firm; common roots; common distinct brown (7.5YR 4/4) clay films on faces of peds; common distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; about 40 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bt4—31 to 39 inches; brown (7.5YR 5/4) very channery silt loam; moderate medium subangular blocky structure; firm; common roots; common distinct brown (7.5YR 4/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; about 45 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bt5—39 to 51 inches; yellowish brown (10YR 5/4) very channery silt loam; weak medium subangular blocky structure; firm; few distinct brown (7.5YR 4/4) clay films on faces of peds; about 45 percent coarse fragments; very strongly acid; clear smooth boundary.

2C—51 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; firm; about 5 percent coarse fragments; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The A horizon has hue of 2.5Y or 10YR, value of 3 to 5, and chroma of 2 to 4. The Bt horizon has chroma of 4 to 8. It is dominantly silt loam, silty clay loam, or the channery or very channery analogs of these textures. In some pedons, however, it is loam in the lower part. The 2C horizon is silt loam, silty clay loam, silty clay, or the channery or very channery analogs of these textures.

Skidmore Series

The Skidmore series consists of deep, well drained, moderately rapidly permeable soils on flood plains along small streams. These soils formed mainly in alluvium that has a high content of gravel. Slope ranges from 0 to 3 percent.

Skidmore soils are commonly adjacent to Haymond, Nolin, and Shelocta soils. The adjacent soils have fewer coarse fragments between depths of 10 and 40 inches than the Skidmore soils. Haymond and Nolin soils are commonly on the flood plains in the wider stream valleys. Shelocta soils are on alluvial fans.

Typical pedon of Skidmore silt loam, occasionally flooded, in an area of Nile Township about 8.5 miles north of Buena Vista; about 1,650 feet south of the intersection of State Route 125 and Upper Twin Creek-Rocky Fork Road, along Upper Twin Creek-Rocky Fork Road, then 100 feet west:

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium and coarse granular structure; friable; common roots; about 10 percent coarse fragments; medium acid; abrupt wavy boundary.

Bw1—9 to 15 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; common roots; about 15 percent coarse fragments; medium acid; abrupt wavy boundary.

2Bw2—15 to 28 inches; yellowish brown (10YR 5/4) extremely gravelly loam; weak coarse subangular blocky structure; friable; few roots; common distinct yellowish brown (10YR 5/6) silt coatings on coarse fragments; about 60 percent coarse fragments; medium acid; clear wavy boundary.

2C1—28 to 45 inches; yellowish brown (10YR 5/4) very gravelly loam; massive; firm; many distinct light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4) silt coatings on coarse fragments; about 50 percent coarse fragments; medium acid; gradual wavy boundary.

2C2—45 to 60 inches; yellowish brown (10YR 5/6) very gravelly loam; massive; firm; common distinct yellowish brown (10YR 5/4) clay films on coarse fragments; few distinct light yellowish brown (10YR 6/4) and few prominent light gray (10YR 7/2) silt coatings on coarse fragments; about 55 percent coarse fragments; medium acid.

The thickness of the solum ranges from 20 to 40 inches. The A horizon has chroma of 2 or 3. It is typically silt loam but is loam in some pedons. The B and C horizons have chroma of 4 to 6. They are gravelly, very gravelly, or extremely gravelly loam.

Steinsburg Series

The Steinsburg series consists of moderately deep, well drained, moderately rapidly permeable soils on ridgetops, shoulder slopes, and the upper parts of side slopes in the uplands. These soils formed mainly in sandstone residuum, but in some areas they formed in material weathered from sandstone conglomerate. Slope ranges from 10 to 50 percent.

Steinsburg soils are commonly adjacent to Berks, Brownsville, Gilpin, Latham, and Shelocta soils. The content of coarse fragments in the subsoil of Berks and Brownsville soils is more than 35 percent. Berks soils are on ridgetops. Brownsville and Shelocta soils are deep. They are commonly on side slopes. Gilpin and Latham soils have more clay in the subsoil than the Steinsburg soils. They generally are in landscape positions similar to those of the Steinsburg soils, but Latham soils also are on foot slopes.

Typical pedon of Steinsburg sandy loam, in an area of the Latham-Steinsburg association, hilly, about 1.3 miles northwest of South Webster; in Bloom Township; about 1,800 feet south and 1,800 feet east of the northwest corner of sec. 10, T. 4 N., R. 19 W.

Oe—1 inch to 0; partially decomposed leaf litter.

A—0 to 8 inches; yellowish brown (10YR 5/4) sandy loam, very pale brown (10YR 7/4) dry; weak fine and medium granular structure; friable; common roots; common distinct dark grayish brown (10YR 4/2) organic coatings on faces of peds; about 10 percent coarse fragments; strongly acid; clear wavy boundary.

Bw1—8 to 16 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine and medium subangular blocky structure; friable; common roots; few faint pale brown (10YR 6/3) silt coatings on sand grains; about 5 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bw2—16 to 22 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few pale brown (10YR 6/3) variegations; common roots; few faint yellowish brown (10YR 5/6) clay bridges between sand grains; about 5 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bw3—22 to 33 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few roots; few distinct strong brown (7.5YR 5/8) clay bridges between sand grains; about 10 percent coarse fragments; strongly acid; abrupt wavy boundary.

R—33 to 43 inches; light yellowish brown (10YR 6/4), weakly consolidated, medium and coarse grained sandstone bedrock.

The thickness of the solum ranges from 10 to 33 inches. The depth to bedrock ranges from 24 to 40 inches.

The A horizon has value of 3 to 5 and chroma of 2 to 4. The A and B horizons are sandy loam or channery sandy loam.

Stendal Series

The Stendal series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in silty alluvium. Slope is 0 to 2 percent.

Stendal soils are commonly adjacent to Cuba, Haymond, Piopolis, and Tioga soils. Cuba, Haymond, and Tioga soils are well drained. Cuba soils are in landscape positions similar to those of the Stendal soils. Haymond and Tioga soils are adjacent to the major streams. Piopolis soils are poorly drained and very poorly drained and are in depressions.

Typical pedon of Stendal silt loam, occasionally flooded, in an area of Bloom Township about 1.75 miles southeast of South Webster; about 2,100 feet north and 2,000 feet east of the southwest corner of sec. 24, T. 4 N., R. 19 W.

Ap—0 to 6 inches; dark grayish brown (2.5Y 4/2) silt loam, light brownish gray (2.5Y 6/2) dry; few medium distinct grayish brown (10YR 5/2) mottles; weak fine granular structure; friable; many roots; common faint dark brown (7.5YR 3/2) and brown (7.5YR 4/2) stains (iron and manganese oxides); about 2 percent coarse fragments; slightly acid; abrupt smooth boundary.

C1—6 to 18 inches; mixed dark grayish brown (2.5Y 4/2) and gray (5Y 5/1) silt loam; weak medium and coarse subangular blocky structure; friable; few roots; common prominent yellowish red (5YR 4/6) silt coatings in root channels; common fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); medium acid; clear irregular boundary.

C2—18 to 24 inches; olive brown (2.5Y 4/4) silt loam; few medium prominent light brownish gray (10YR 6/2) and few medium prominent strong brown (7.5YR 5/8) mottles; weak medium and coarse subangular blocky structure; friable; few roots; common distinct grayish brown (10YR 5/2) silt coatings on faces of peds; many fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); strongly acid; clear wavy boundary.

C3—24 to 33 inches; olive brown (2.5Y 4/4) silt loam; common medium distinct light brownish gray (10YR 6/2) and common fine prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable; few roots; common prominent light gray (10YR 6/1) silt coatings on faces of peds; many fine black (10YR 2/1) and very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); strongly acid; clear wavy boundary.

C4—33 to 46 inches; grayish brown (2.5Y 5/2) silt loam; common medium distinct light gray (10YR 6/1) and few fine prominent strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; friable; few roots; common distinct light gray (10YR 6/1) silt coatings on faces of peds; many fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); strongly acid; clear wavy boundary.

C5—46 to 60 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light gray (10YR 6/1) and few fine distinct strong brown (7.5YR 5/8) mottles; massive; friable; many fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); strongly acid.

The Ap horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 2 or 3.

Tilsit Series

The Tilsit series consists of deep, moderately well drained soils on uplands. These soils formed in loess and in the underlying material weathered from acid sandstone, shale, and siltstone. They have a fragipan. Permeability is moderate above the fragipan and slow in the fragipan. Slope ranges from 3 to 8 percent.

Tilsit soils are similar to Monongahela, Omulga, and Sciotoville soils and are commonly adjacent to Berks, Coolville, and Latham soils. Berks soils are on narrow ridgetops. They have a higher content of coarse fragments in the subsoil than the Tilsit soils. Coolville and Latham soils have more clay in the subsoil than the Tilsit soils. Coolville soils are in landscape positions similar to those of the Tilsit soils. Latham soils are on side slopes, ridgetops, and foot slopes. Monongahela soils have more sand in the subsoil than the Tilsit soils. Omulga and Sciotoville soils have a base saturation that is higher than that of the Tilsit soils.

Typical pedon of Tilsit silt loam, in an area of the Tilsit-Coolville association, undulating, about 3.7 miles northeast of Lucasville; in Jefferson Township; about 1,800 feet north and 2,800 feet east of the southwest corner of sec. 23, T. 3 N., R. 21 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; common roots; medium acid; clear wavy boundary.

BE—8 to 12 inches; about 60 percent brown (10YR 4/3) and 40 percent yellowish brown (10YR 5/8) silt loam; weak medium subangular blocky structure; friable; common roots; few distinct yellowish brown (10YR 5/6) silt coatings on faces of peds; about 1 percent coarse fragments; medium acid; abrupt wavy boundary.

Bt1—12 to 19 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common roots; few distinct yellowish brown (10YR 5/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/8) silt coatings on faces of peds; few fine black (10YR 2/1) stains (iron and manganese oxides); about 1 percent coarse fragments; strongly acid; clear smooth boundary.

Bt2—19 to 24 inches; light yellowish brown (10YR 6/4) silt loam; common medium distinct brown (10YR 5/3) and few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few roots; common faint light yellowish brown (10YR 6/4) clay films on faces of peds; few distinct yellowish brown (10YR 5/6) silt coatings on faces of peds; common fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 1 percent coarse fragments; strongly acid; abrupt smooth boundary.

2Btx1—24 to 29 inches; yellowish brown (10YR 5/4) silt loam; common coarse distinct grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/8) mottles; weak very coarse prismatic structure parting to moderate thick platy; very firm; brittle; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct yellowish brown (10YR 5/8) silt coatings on faces of peds; few fine very dark grayish brown (10YR 3/2) stains (iron and manganese oxides); about 2 percent coarse fragments; strongly acid; clear wavy boundary.

2Btx2—29 to 37 inches; yellowish brown (10YR 5/4) silt loam; common medium prominent reddish yellow (7.5YR 6/8) and common fine distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to moderate thick platy; very firm; brittle; many distinct brown (10YR 4/3) and grayish brown (10YR 5/2) clay films on faces of peds; few fine black (10YR 2/1) stains (iron and manganese oxides); about 2 percent coarse fragments; strongly acid; clear wavy boundary.

2Btx3—37 to 47 inches; brown (7.5YR 5/4) silty clay loam; common medium prominent gray (10YR 6/1) mottles; weak very coarse prismatic structure parting to moderate medium angular blocky; very firm; brittle; many distinct light brownish gray (10YR 6/2) clay films on vertical faces of peds; few prominent strong brown (7.5YR 5/8) silt coatings on faces of peds; few fine black (10YR 2/1) stains (iron and manganese oxides); about 2 percent coarse fragments; strongly acid; clear wavy boundary.

2Bt—47 to 60 inches; strong brown (7.5YR 5/6) silty clay loam; common coarse prominent gray (10YR 6/1) and common medium prominent yellowish brown (10YR 5/4) mottles; weak very coarse prismatic structure parting to moderate medium angular blocky; firm; many prominent gray (10YR 6/1) and few distinct strong brown (7.5YR 5/4) clay films on faces of peds; few distinct pale brown (10YR 6/3) silt coatings on faces of peds; about 2 percent coarse fragments; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock ranges from 40 to 120 inches. The content of coarse fragments typically is 0 to 10 percent in the solum. In some pedons it is as much as 20 percent in the lower part of the solum. The depth to the top of the fragipan is 22 to 28 inches.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has value of 5 or 6 and chroma of 4 to 6. The 2Btx and 2Bt horizons have chroma of 4 to 8. The 2Btx horizon is silt loam or silty clay loam. The 2Bt horizon is channery silty clay loam, silt loam, or silty clay loam.

Tioga Series

The Tioga series consists of deep, well drained soils on flood plains. These soils formed in alluvium derived mainly from sandstone or siltstone. Permeability is moderate or moderately rapid in the solum and rapid in the substratum. Slope ranges from 0 to 3 percent.

Tioga soils are commonly adjacent to Cuba and Haymond soils. The adjacent soils have less sand between depths of 10 and 40 inches than the Tioga soils. They are in landscape positions similar to those of the Tioga soils.

Typical pedon of Tioga loam, occasionally flooded, in an area of Green Township about 1.5 miles northwest of Powellsville; about 2,400 feet southeast of the intersection of State Route 522 and Oakes Road, along Oakes Road, then 1,100 feet east:

Ap—0 to 13 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak medium angular and subangular blocky structure; friable; common roots; common faint brown (10YR 4/3) silt coatings on faces of peds; dark yellowish brown (10YR 4/4) worm casts; few black (10YR 2/1) concretions (iron and manganese oxides); few very dark grayish brown (10YR 3/2) and common brown (10YR 5/3) stains (iron and manganese oxides); medium acid; abrupt smooth boundary.

Bw—13 to 24 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse subangular blocky structure; very friable; few roots; medium acid; clear smooth boundary.

C1—24 to 43 inches; yellowish brown (10YR 5/4) loamy fine sand; common fine faint very pale brown (10YR 7/4) mottles; single grained; loose; medium acid; clear smooth boundary.

C2—43 to 48 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; very friable; medium acid; clear smooth boundary.

C3—48 to 57 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; loose; medium acid; clear smooth boundary.

C4—57 to 77 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; very friable; slightly acid.

The thickness of the solum ranges from 18 to 40 inches. The Ap horizon is typically loam but is fine sandy loam in some pedons. The Bw horizon has value of 4 or 5. It is fine sandy loam, loam, or silt loam. The C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is fine sandy loam or loamy fine sand.

Weinbach Series

The Weinbach series consists of deep, somewhat poorly drained soils on terraces along streams. These soils formed in old alluvium. They have a fragipan. Permeability is moderate above the fragipan and very slow in the fragipan. Slope ranges from 0 to 3 percent.

Weinbach soils are similar to Doles soils and are commonly adjacent to Elkinsville, Peoga, and Sciotoville soils. Doles soils do not have mica flakes in the solum. The well drained Elkinsville and moderately well drained Sciotoville soils are in the slightly higher landscape positions. The poorly drained Peoga soils are on flats and in depressions.

Typical pedon of Weinbach silt loam, 0 to 3 percent slopes, in an area of Green Township about 0.7 mile north of Haverhill; about 4,100 feet northwest of the intersection of Haverhill-Ohio Furnace Road and Gallia Pike, along Gallia Pike, then 2,800 feet east:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure parting to weak medium and fine granular; friable; few roots; many coarse and medium black (10YR 2/1) concretions (iron and manganese oxides); medium acid; abrupt smooth boundary.

Bt1—10 to 21 inches; brown (10YR 5/3) silty clay loam; few coarse faint light brownish gray (10YR 6/2), common medium faint grayish brown (10YR 5/2), and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; many distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few medium distinct strong brown (7.5YR 5/6) soft accumulations and many fine and medium distinct black (10YR 2/1) concretions (iron and manganese oxides); few fine mica flakes; strongly acid; clear smooth boundary.

Bt2—21 to 29 inches; brown (10YR 5/3) silty clay loam; many medium distinct yellowish brown (10YR 5/6), many medium faint light brownish gray (10YR 6/2), and common medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; few roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; many distinct grayish brown (10YR 5/2) silt coatings on faces of peds; few medium distinct strong brown (7.5YR 5/6) soft accumulations and many fine black (10YR 2/1) concretions (iron and manganese oxides); few fine mica flakes; strongly acid; abrupt smooth boundary.

Btx1—29 to 43 inches; strong brown (7.5YR 5/6) silty clay loam; common coarse prominent gray (10YR 5/1 and 6/1) mottles; weak very coarse prismatic structure parting to moderate medium platy; very firm; brittle; common prominent gray (10YR 5/1) clay films and silt coatings on faces of peds; many medium distinct black (10YR 2/1) soft accumulations and few fine black (10YR 2/1) concretions (iron and manganese oxides); few fine mica flakes; strongly acid; clear smooth boundary.

Btx2—43 to 51 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct brown (7.5YR 5/2) and yellowish brown (10YR 5/6) mottles; weak very coarse prismatic structure parting to moderate medium platy; very firm; brittle; common prominent brown (7.5YR 5/2) clay films and silt coatings on faces of peds; many fine distinct black (10YR 2/1) soft accumulations (iron and manganese oxides); common fine mica flakes; strongly acid; abrupt smooth boundary.

BC—51 to 70 inches; dark brown (7.5YR 4/4) silt loam; common medium distinct brown (7.5YR 5/2) and few fine distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium platy; friable; common fine distinct black (10YR 2/1) soft accumulations (iron and manganese oxides); common fine mica flakes; strongly acid.

The thickness of the solum ranges from 50 to 72 inches. The depth to the top of the fragipan is 24 to 36 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4. The Bt and Btx horizons are silt loam or silty clay loam. The Bt horizon has chroma of 3 or 4. The Btx horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The BC horizon has hue of 10YR or 7.5YR and value of 4 or 5. It is silt loam or loam.

Wharton Series

The Wharton series consists of deep, moderately well drained soils on side slopes and foot slopes in the uplands. These soils formed in residuum and colluvium derived from shale, siltstone, and fine grained sandstone. Permeability is moderately slow or slow. Slope ranges from 8 to 35 percent.

Wharton soils are similar to Gilpin and Shelocta soils and are commonly adjacent to Ernest, Gilpin, Latham, and Shelocta soils. Ernest soils are on foot slopes. They have a fragipan. Gilpin and Latham soils are moderately deep over bedrock. Gilpin soils are on shoulder slopes, and Latham soils are on side slopes, ridgetops, and foot slopes. The well drained Shelocta soils are on hillsides and fans.

Typical pedon of Wharton silt loam, in an area of the Shelocta-Wharton-Latham association, steep, about 1.5 miles west-southwest of Powellsville; in Green Township; about 3,200 feet north-northwest of the intersection of Oakes Road and Powellsville Road, along Oakes Road, then 1,000 feet west:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine and medium granular structure; friable; common roots; few fine black (10YR 2/1) concretions and stains (iron and manganese oxides); about 10 percent coarse fragments; medium acid; abrupt wavy boundary.

BE—5 to 14 inches; yellowish brown (10YR 5/6) channery silt loam; moderate medium subangular blocky structure; friable; few roots; common distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; brown (10YR 4/3) worm casts; common fine black (10YR 2/1) concretions and stains (iron and manganese oxides); about 15 percent coarse fragments; medium acid; clear wavy boundary.

Bt1—14 to 23 inches; yellowish brown (10YR 5/6) silt loam; strong medium subangular blocky structure; firm; few roots; common faint yellowish brown (10YR 5/6) clay films on faces of peds; common distinct strong brown (7.5YR 5/6) silt coatings on faces of peds; yellowish brown (10YR 5/4) worm casts; common fine very dark grayish brown (10YR 3/2) and red (2.5YR 4/6) stains (iron and manganese oxides); about 10 percent coarse fragments; strongly acid; clear wavy boundary.

Bt2—23 to 30 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct red (2.5YR 5/6) mottles; strong fine and medium subangular blocky structure; firm; common distinct yellowish red (5YR 4/6) clay films on faces of peds; few distinct strong brown (7.5YR 5/6) silt coatings on faces of peds; about 10 percent coarse fragments; strongly acid; clear wavy boundary.

Bt3—30 to 39 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent gray (10YR 6/1) and common fine prominent red (2.5YR 4/8) mottles; strong medium subangular blocky structure; firm; many distinct yellowish red (5YR 5/6) clay films on faces of peds; few distinct yellowish red (5YR 5/6) silt coatings on faces of peds; about 5 percent coarse fragments; strongly acid; clear smooth boundary.

Bt4—39 to 46 inches; yellowish brown (10YR 5/6) silty clay loam; common medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; common prominent gray (10YR 6/1), common distinct yellowish brown (10YR 5/4), and common prominent yellowish red (5YR 5/6) clay films on faces of peds; few fine very dark grayish brown (10YR 3/2) concretions and few yellowish red (5YR 5/8) stains (iron and manganese oxides); about 10 percent coarse fragments; strongly acid; clear smooth boundary.

Bt5—46 to 52 inches; strong brown (7.5YR 5/6) silty clay loam; common medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; many prominent light brownish gray (2.5Y 6/2) and gray (10YR 6/1) clay films on faces of peds; common distinct yellowish red (5YR 4/6) clay films on vertical faces of peds; few faint strong brown (7.5YR 5/6) silt coatings on faces of peds; few fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); about 5 percent coarse fragments; strongly acid; clear smooth boundary.

Bt6—52 to 60 inches; yellowish brown (10YR 5/6) silty clay loam; few medium prominent gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; common prominent gray (10YR 6/1) and strong brown (7.5YR 5/6) clay films on faces of peds; about 5 percent coarse fragments; strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The depth to bedrock ranges from 40 to more than 72 inches.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3. The BE horizon has value of 5 or 6 and chroma of 4 to 6. It is silt loam or channery silt loam. The Bt horizon has value of 4 to 6 and chroma of 4 to 8. It is silt loam, channery silt loam, silty clay loam, shaly silty clay loam, or clay loam. The content of coarse fragments in this horizon ranges from 5 to 20 percent.

Wheeling Series

The Wheeling series consists of deep, well drained soils on terraces. These soils formed in silty or loamy material underlain by noncalcareous sandy material at a depth of more than 40 inches. Permeability is moderate in the subsoil and rapid in the substratum. Slope ranges from 1 to 8 percent.

Wheeling soils are similar to Ockley soils and are commonly adjacent to Elkinsville, Fitchville, Sardinia, Sciotoville, and Weinbach soils. Ockley soils are mildly alkaline or moderately alkaline in the substratum. Elkinsville, Sardinia, and Sciotoville soils have less sand in the subsoil than the Wheeling soils. Elkinsville soils are in landscape positions similar to those of the Wheeling soils. Sardinia and Sciotoville soils are in the slightly lower positions. The somewhat poorly drained Fitchville and Weinbach soils are along drainageways and on flats.

Typical pedon of Wheeling silt loam, 1 to 8 percent slopes, in an area of Green Township about 4.5 miles southeast of Franklin Furnace; about 1,400 feet south of the intersection of Gallia Pike and Junior Furnace Road, along Gallia Pike, then 1,700 feet east:

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

Bt1—9 to 18 inches; yellowish brown (10YR 5/6) silt loam; moderate coarse prismatic structure parting to moderate medium and fine subangular blocky; firm; few roots; common distinct yellowish brown (10YR 5/4) clay films on vertical faces of peds; many distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; few fine dark brown (7.5YR 3/2) concretions (iron and manganese oxides); medium acid; clear smooth boundary.

Bt2—18 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium and fine subangular blocky structure; friable; few roots; common yellowish brown (10YR 5/4) variegations; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few faint yellowish brown (10YR 5/4) silt coatings on faces of peds; few medium very dark gray (10YR 3/1) concretions (iron and manganese oxides); about 5 percent fine gravel; few mica flakes; strongly acid; clear smooth boundary.

Bt3—26 to 36 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular and angular blocky structure; friable; few roots; common dark brown (7.5YR 4/4) variegations; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine dark brown (7.5YR 3/2) concretions (iron and manganese oxides); few mica flakes; strongly acid; clear smooth boundary.

Bt4—36 to 42 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; few roots; few pale brown (10YR 6/3) and dark brown (7.5YR 4/4) variegations; common faint dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; few fine dark brown (7.5YR 3/2) concretions (iron and manganese oxides); few mica flakes; strongly acid; abrupt smooth boundary.

BC—42 to 53 inches; dark brown (7.5YR 4/4) fine sandy loam; weak medium platy structure parting to weak medium and fine subangular blocky; friable; common dark yellowish brown (10YR 4/4) variegations; few fine very dark grayish brown (10YR 3/2) concretions (iron and manganese oxides); few mica flakes; medium acid; abrupt smooth boundary.

C—53 to 60 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose; lenses of fine sandy loam and loam; medium acid.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon is typically silt loam but is loam in some pedons. The Bt horizon has hue of 10YR or 7.5YR and chroma of 4 to 6. The C horizon has value of 4 or 5 and chroma of 4 to 6.

Wyatt Series

The Wyatt series consists of deep, moderately well drained, slowly permeable or very slowly permeable soils in preglacial valleys. These soils formed in clayey lacustrine sediments. Slope ranges from 1 to 15 percent.

Wyatt soils are commonly adjacent to Doles, Monongahela, and Omulga soils. The adjacent soils have less clay in the upper part of the subsoil than the Wyatt soils. Doles soils are in the lower landscape positions. Monongahela and Omulga soils are in positions similar to those of the Wyatt soils.

Typical pedon of Wyatt silt loam, 1 to 8 percent slopes, in an area of Madison Township about 3.75 miles north-northwest of Muletown; about 1,325 feet east and 700 feet south of the northwest corner of sec. 17, T. 4 N., R. 20 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—6 to 10 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular blocky structure; friable; many fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common distinct dark yellowish brown (10YR 4/4) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt2—10 to 15 inches; yellowish brown (10YR 5/6) silty clay; moderate medium subangular blocky structure; firm; common fine roots; common distinct yellowish brown (10YR 5/4) clay films on faces of peds; common faint yellowish brown (10YR 5/6) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt3—15 to 19 inches; yellowish brown (10YR 5/6) silty clay; few fine prominent grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common fine roots; common faint yellowish brown (10YR 5/6) clay films on faces of peds; common distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt4—19 to 25 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct dark yellowish brown (10YR 4/6) and common fine prominent grayish brown (10YR 5/2) clay films on faces of peds; few slickensides; common distinct yellowish brown (10YR 5/4) silt coatings on faces of peds; very strongly acid; clear smooth boundary.

Bt5—25 to 31 inches; yellowish brown (10YR 5/6) clay; moderate coarse prismatic structure parting to moderate coarse subangular blocky; firm; few fine roots; common distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) clay films on faces of peds; common slickensides; very strongly acid; clear smooth boundary.

Bt6—31 to 42 inches; yellowish brown (10YR 5/6) clay; weak coarse prismatic structure parting to weak coarse subangular blocky; very firm; common distinct dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) clay films on faces of peds; common slickensides; very strongly acid; clear smooth boundary.

BC—42 to 55 inches; brown (10YR 4/3) clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; very firm; many slickensides; many black (10YR 2/1) concretions (iron and manganese oxides); neutral; clear smooth boundary.

C—55 to 60 inches; brown (10YR 4/3) clay; weak coarse prismatic structure; very firm; many slickensides; many distinct gray (5Y 6/1) and many prominent brownish yellow (10YR 6/6) horizontal bands in the matrix; mildly alkaline.

The thickness of the solum ranges from 36 to 60 inches. The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has value of 4 or 5 and chroma of 3 to 6. The C horizon has value of 4 or 5 and chroma of 3 or 4. It is dominantly silty clay or clay but has thin strata of silty clay loam in some pedons.

Formation of the Soils

The major factors of soil formation are the physical and chemical composition of the parent material, the climate during and after the accumulation of the parent material, the kinds of plants and animals on or in the soil, relief and its effect on runoff, and time. The interaction of these factors results in differences among soils. The effects of one factor can differ from place to place.

Parent Material

Parent material is the unconsolidated mass in which the soils form. The soils in Scioto County formed in bedrock residuum, colluvium, loess, alluvium, lacustrine material, and material in surface-mined areas.

Soils that formed in bedrock residuum, such as Berks, Gilpin, and Latham soils, make up about 13 percent of the county. The texture of these soils is influenced by the texture of the underlying bedrock.

Colluvium is weathered material that has been moved downslope by gravity. Because of this downslope movement, the soils on the lower, more concave parts of the slopes are deeper than those on the upper parts and have disoriented coarse fragments. Ernest soils, which make up less than 1 percent of the county, formed entirely in colluvium. Soils that formed in colluvium and residuum make up about 60 percent of the county. Brownsville, Shelocta, and Wharton soils are examples.

Coolville and Tilsit soils formed in loess and in the underlying bedrock residuum. These soils make up about 3 percent of the county. Alford soils, which make up less than 1 percent of the county, formed entirely in loess. Soils that formed in loess, colluvium, old alluvium, or lacustrine material in preglacial valleys make up about 7 percent of the county. Omulga and Wyatt soils are examples.

Soils that formed in alluvium and glacial outwash in valleys make up about 13 percent of the county. Nolin, Skidmore, and Huntington are examples of soils that formed in recent alluvium. Sciotoville, Sardinia, and Peoga are examples of soils that formed in old alluvium. Casco and Ockley soils formed in glacial outwash.

Bethesda soils, which make up less than 1 percent of the county, formed in a mixture of partly weathered fine-earth material and fragments of shale, sandstone, and siltstone. These soils are in areas that have been surface mined for coal.

Climate

Climate affects the physical, chemical, and biological relationships in the soils. It influences the kind and number of plants and animals on and in the soils, the weathering of rocks and minerals, the susceptibility of the soils to erosion, and the rate of soil formation.

The climate of Scioto County is humid and temperate. The average annual precipitation is about 40 inches, and the mean annual air temperature is about 57 degrees F. The soils are almost never dry and are subject to leaching throughout most of the year. Most of the soluble bases have been leached out of the solum, and clay minerals have been moved from the surface layer to the subsoil. As a result, most of the soils have a leached, acid surface layer that is coarser textured than the subsoil.

Plant and Animal Life

Plants and animals, but mainly plants, are active soil-forming factors. They modify the color and organic matter content of the soil. Plants transfer nutrients from the lower part of the solum to the upper soil layers. They produce channels through which air and water move, and they can modify soil structure. Micro-organisms and animals mix and decompose organic matter, making nutrients available to plants, and generally improve the condition of the soil.

The native vegetation in the county was dominantly deciduous trees, mainly oaks, yellow-poplar, and hickories. Virginia pine, shortleaf pine, and pitch pine were common in areas of droughty soils on narrow ridgetops. Because of flooding, grasses replaced hardwoods as the dominant vegetation in some areas on the bottom land along the major rivers. Grass roots penetrate to a greater depth than tree roots. They increase the organic matter content and thickness of the dark surface soil in some alluvial soils, such as Huntington and Rossburg soils.

Relief

Relief influences soils chiefly through its effects on drainage and erosion. It directly affects the microclimate. Slopes that face south or southwest are drier and less productive than those that face north or northeast.

Aspect affects the degree of exposure to the prevailing wind and to direct sunlight and thus also affects evapotranspiration, the breakdown of organic matter, and the kind and growth rate of vegetation.

Some of the steeper soils in the county are moderately deep because of the loss of soil material through erosion. Berks soils are an example. Most steep soils that formed partly in colluvium are deep because of the additions of material that has moved downhill. Examples are Shelocta and Brownsville soils.

Relief generally determines the depth to the water table. The water table has important effects on the development of a soil profile. Soils that formed in similar kinds of parent material but in different topographic positions can show differences in internal drainage. From an equal amount of rainfall, sloping soils receive less water than nearly level soils and depressional soils receive more water than the nearly level soils.

Time

Time is required for changes to take place in the parent material and for uniquely different kinds of soil to form. The length of time required for soil formation in Scioto County has been greatly influenced by the parent material and by topography. Soils that formed in shale residuum have a more strongly developed profile than soils that formed in siltstone or sandstone residuum because shale weathers more rapidly than sandstone and siltstone. Steep residual soils commonly are less well developed than their more gently sloping counterparts because less water moves through the parent material and, in colluvial areas, the downslope movement of soil material tends to disrupt the formation process. Gently sloping or nearly level soils tend to exhibit the greatest degree of profile development. Exceptions are soils on flood plains where the frequent deposition of alluvial material has limited the development of distinct horizons.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

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.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils 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—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

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.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

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.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil 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 are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. The depth of the soil over bedrock. Deep soils are more than 40 inches deep over bedrock; moderately deep soils, 20 to 40 inches; and shallow soils, 10 to 20 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 periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not 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.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and 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.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 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 (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons 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, any plowed or disturbed surface layer.

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 O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon 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) granular, 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 horizon. 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.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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—
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.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
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.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

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.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Perimeter drain. A drain installed around the perimeter of a septic tank absorption field to lower the water table; also called a curtain drain.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains 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 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 degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly 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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts 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-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. 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.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar 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 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

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.

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 of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (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 soil blowing 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. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

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.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Water bar. A shallow trench and a mound of earth constructed at an angle across a road or trail to intercept and divert surface runoff and control erosion.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically 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 1951-80 at Portsmouth, Ohio)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	40.6	23.4	32.0	70	-5	14	3.15	1.81	4.34	8	6.3
February---	43.8	25.4	34.6	72	1	17	2.98	1.32	4.39	7	5.2
March------	54.2	34.0	44.1	83	13	61	4.06	2.19	5.69	9	3.0
April------	67.1	43.7	55.4	88	25	184	3.57	1.90	5.02	8	.1
May--------	76.3	52.7	64.5	92	33	450	3.96	2.28	5.44	8	.0
June-------	83.2	60.9	72.1	95	46	663	3.77	2.25	5.12	7	.0
July-------	86.4	65.3	75.9	97	51	803	4.42	2.60	6.04	8	.0
August-----	85.4	64.2	74.8	97	50	769	4.00	2.22	5.57	6	.0
September--	79.8	57.8	68.8	95	39	564	3.36	1.57	4.92	5	.0
October----	68.7	45.3	57.0	88	26	245	2.30	1.15	3.30	5	.0
November---	55.9	35.8	45.9	79	15	35	2.70	1.58	3.69	7	1.4
December---	45.1	27.8	36.5	72	4	17	3.04	1.51	4.36	7	1.8
Yearly:											
Average--	65.5	44.7	55.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	98	-7	---	---	---	---	---	---
Total----	---	---	---	---	---	3,822	41.33	35.97	46.48	85	17.8

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-80 at Portsmouth, 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. 4	Apr. 14	Apr. 26
2 years in 10 later than--	Mar. 30	Apr. 10	Apr. 22
5 years in 10 later than--	Mar. 19	Apr. 2	Apr. 14
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 28	Oct. 22	Oct. 10
2 years in 10 earlier than--	Nov. 3	Oct. 27	Oct. 15
5 years in 10 earlier than--	Nov. 14	Nov. 5	Oct. 24

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Portsmouth, 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	214	197	173
8 years in 10	223	204	180
5 years in 10	239	217	192
2 years in 10	256	229	205
1 year in 10	264	236	211

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AfD	Alford silt loam, 10 to 25 percent slopes	660	0.2
BeC	Berks channery silt loam, 8 to 15 percent slopes	8,913	2.3
BhD	Bethesda very shaly clay loam, 8 to 25 percent slopes	838	0.2
BrF	Brownsville-Rock outcrop association, very steep	2,888	0.7
CaF	Casco loam, 40 to 70 percent slopes	279	0.1
CoB	Coolville silt loam, 1 to 8 percent slopes	1,513	0.4
CpC	Coolville-Rarden silt loams, 8 to 15 percent slopes	7,911	2.0
Cu	Cuba silt loam, occasionally flooded	1,280	0.3
DoA	Doles silt loam, 0 to 3 percent slopes	1,409	0.4
Dp	Dumps	85	*
EkB	Elkinsville silt loam, 1 to 8 percent slopes	2,768	0.7
EkE	Elkinsville silt loam, 25 to 40 percent slopes	1,679	0.4
EmB	Elkinsville-Urban land complex, 1 to 8 percent slopes	1,541	0.4
ErD	Ernest silt loam, 15 to 25 percent slopes	1,003	0.3
FcA	Fitchville silt loam, 0 to 3 percent slopes	1,940	0.5
Ge	Genesee silt loam, occasionally flooded	2,365	0.6
Ha	Haymond silt loam, occasionally flooded	3,054	0.8
Hu	Huntington silt loam, occasionally flooded	522	0.1
La	Landes fine sandy loam, occasionally flooded	1,031	0.3
LbC	Latham silt loam, 8 to 15 percent slopes	233	0.1
LbD	Latham silt loam, 15 to 25 percent slopes	7,739	2.0
LcE	Latham-Brownsville-Shelocta association, steep	4,287	1.1
LgD	Latham-Gilpin association, hilly	17,611	4.5
LsD	Latham-Steinsburg association, hilly	1,769	0.4
MoB	Monongahela silt loam, 1 to 8 percent slopes	979	0.2
MoC2	Monongahela silt loam, 8 to 15 percent slopes, eroded	4,244	1.1
No	Nolin silt loam, occasionally flooded	12,086	3.1
OcB	Ockley loam, 1 to 8 percent slopes	1,023	0.3
OmB	Omulga silt loam, 1 to 8 percent slopes	12,414	3.2
OmC	Omulga silt loam, 8 to 15 percent slopes	5,840	1.5
OpB	Omulga-Urban land complex, 1 to 8 percent slopes	1,637	0.4
OpC	Omulga-Urban land complex, 8 to 15 percent slopes	688	0.2
Pe	Peoga silt loam, rarely flooded	1,229	0.3
Po	Piopolis silt loam, ponded	324	0.1
Ps	Pits, gravel	274	0.1
Pt	Pits, quarry	437	0.1
RbC	Rarden silt loam, 8 to 15 percent slopes	282	0.1
Ro	Rossburg silty clay loam, occasionally flooded	550	0.1
SaB	Sardinia silt loam, 1 to 8 percent slopes	2,247	0.6
SacB	Sciotoville silt loam, 1 to 8 percent slopes	2,161	0.6
SbB	Shelocta silt loam, 3 to 8 percent slopes	10,880	2.8
SbC	Shelocta silt loam, 8 to 15 percent slopes	2,119	0.5
SbD	Shelocta silt loam, 15 to 25 percent slopes	3,584	0.9
ScE	Shelocta-Brownsville association, steep	19,830	5.1
ScF	Shelocta-Brownsville association, very steep	115,340	29.6
SeF	Shelocta-Steinsburg association, very steep	16,016	4.1
SfE	Shelocta-Wharton-Latham association, steep	66,649	17.1
Sk	Skidmore silt loam, occasionally flooded	6,645	1.7
St	Stendal silt loam, occasionally flooded	2,195	0.6
TcB	Tilsit-Coolville association, undulating	5,029	1.3
To	Tioga loam, occasionally flooded	2,547	0.7
WeA	Weinbach silt loam, 0 to 3 percent slopes	2,592	0.7
WfD	Wharton silt loam, 15 to 25 percent slopes	7,033	1.8
WkD	Wharton-Urban land complex, 8 to 20 percent slopes	2,077	0.5
WmB	Wheeling silt loam, 1 to 8 percent slopes	1,450	0.4
WpB	Wheeling-Urban land complex, 1 to 8 percent slopes	1,900	0.5
WyB	Wyatt silt loam, 1 to 8 percent slopes	1,398	0.4
WyC2	Wyatt silt loam, 8 to 15 percent slopes, eroded	805	0.2
	Water	1,362	0.3
	Total	389,184	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
CoB	Coolville silt loam, 1 to 8 percent slopes
Cu	Cuba silt loam, occasionally flooded
DoA	Doles silt loam, 0 to 3 percent slopes (where drained)
EkB	Elkinsville silt loam, 1 to 8 percent slopes
FcA	Fitchville silt loam, 0 to 3 percent slopes (where drained)
Ge	Genesee silt loam, occasionally flooded
Ha	Haymond silt loam, occasionally flooded
Hu	Huntington silt loam, occasionally flooded
La	Landes fine sandy loam, occasionally flooded
MoB	Monongahela silt loam, 1 to 8 percent slopes
No	Nolin silt loam, occasionally flooded
OcB	Ockley loam, 1 to 8 percent slopes
OmB	Omulga silt loam, 1 to 8 percent slopes
Pe	Peoga silt loam, rarely flooded (where drained)
Ro	Rossburg silty clay loam, occasionally flooded
SaB	Sardinia silt loam, 1 to 8 percent slopes
SacB	Sciotoville silt loam, 1 to 8 percent slopes
SbB	Shelocta silt loam, 3 to 8 percent slopes
St	Stendal silt loam, occasionally flooded (where drained)
To	Tioga loam, occasionally flooded
WeA	Weinbach silt loam, 0 to 3 percent slopes (where drained)
WmB	Wheeling silt loam, 1 to 8 percent slopes
WyB	Wyatt silt loam, 1 to 8 percent slopes

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Orchardgrass-ladino clover	Tobacco
	Bu	Bu	Bu	Tons	AUM*	Lbs
AfD----------------------- Alford	80	---	30	3.0	5.5	---
BeC----------------------- Berks	---	---	---	---	---	---
BhD----------------------- Bethesda	---	---	---	---	---	---
BrF**:						
Brownsville---------------	---	---	---	---	---	---
Rock outcrop.						
CaF----------------------- Casco	---	---	---	---	---	---
CoB----------------------- Coolville	95	30	40	4.0	6.5	3,000
CpC----------------------- Coolville-Rarden	90	25	35	3.7	6.0	2,700
Cu------------------------ Cuba	110	37	---	3.5	6.5	2,600
DoA----------------------- Doles	90	30	35	3.0	6.5	---
Dp**. Dumps						
EkB----------------------- Elkinsville	115	42	48	4.0	7.0	2,800
EkE----------------------- Elkinsville	---	---	---	---	---	---
EmB**--------------------- Elkinsville-Urban land	---	---	---	---	---	---
ErD----------------------- Ernest	80	---	30	2.5	5.5	---
FcA----------------------- Fitchville	110	35	38	4.3	6.0	---
Ge------------------------ Genesee	110	37	---	3.5	---	---
Ha------------------------ Haymond	105	39	---	3.7	---	2,600
Hu------------------------ Huntington	120	45	---	3.5	---	---

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Orchardgrass-ladino clover	Tobacco
	Bu	Bu	Bu	Tons	AUM*	Lbs
La---------------------- Landes	90	24	---	2.6	---	---
LbC--------------------- Latham	85	---	32	3.5	5.5	---
LbD--------------------- Latham	---	---	---	---	5.5	---
LcE**:						
Latham------------------	---	---	---	---	---	---
Brownsville-------------	---	---	---	---	5.0	---
Shelocta----------------	---	---	---	---	6.0	---
LgD**:						
Latham------------------	80	---	30	3.0	5.0	2,700
Gilpin------------------	80	---	---	2.5	6.0	2,500
LsD**:						
Latham------------------	---	---	---	---	4.0	---
Steinsburg--------------	---	---	---	2.0	4.0	---
MoB--------------------- Monongahela	100	35	40	3.0	6.5	2,500
MoC2-------------------- Monongahela	85	25	35	3.0	6.0	2,500
No---------------------- Nolin	115	37	---	3.5	6.0	2,800
OcB--------------------- Ockley	105	35	40	3.6	7.0	2,700
OmB--------------------- Omulga	105	35	45	3.5	6.5	2,600
OmC--------------------- Omulga	95	30	40	3.0	6.0	2,500
OpB**------------------- Omulga-Urban land	---	---	---	---	---	---
OpC**------------------- Omulga-Urban land	---	---	---	---	---	---
Pe---------------------- Peoga	90	35	40	4.1	---	---
Po---------------------- Piopolis	---	---	---	---	---	---
Ps**, Pt**. Pits						
RbC--------------------- Rarden	80	30	30	3.0	5.5	2,500

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Orchardgrass-ladino clover	Tobacco
	Bu	Bu	Bu	Tons	AUM*	Lbs
Ro-----Rossburg	120	42	50	4.5	---	---
SaB-----Sardinia	110	40	45	4.5	6.0	2,500
SacB-----Sciotoville	105	37	47	3.4	6.0	2,200
SbB-----Shelocta	100	35	40	4.0	9.0	2,600
SbC-----Shelocta	95	30	35	4.0	8.0	2,300
SbD-----Shelocta	80	---	---	3.2	7.0	---
ScE**:						
Shelocta-----	---	---	---	---	---	---
Brownsville-----	---	---	---	---	---	---
ScF**:						
Shelocta-----	---	---	---	---	---	---
Brownsville-----	---	---	---	---	---	---
SeF**:						
Shelocta-----	---	---	---	---	---	---
Steinsburg-----	---	---	---	---	---	---
SfE**:						
Shelocta-----	---	---	---	---	---	---
Wharton-----	---	---	---	---	---	---
Latham-----	---	---	---	---	---	---
Sk-----Skidmore	85	30	35	3.0	4.5	2,600
St-----Stendal	90	30	40	---	---	---
TcB**:						
Tilsit-----	100	35	40	3.5	6.5	2,600
Coolville-----	95	30	40	3.5	6.5	2,500
To-----Tioga	100	35	45	3.5	7.5	2,300
WeA-----Weinbach	100	35	40	3.6	6.5	---
WfD-----Wharton	80	---	30	3.0	5.0	---

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Orchardgrass-ladino clover	Tobacco
	Bu	Bu	Bu	Tons	AUM*	Lbs
WkD**---------------------- Wharton-Urban land	---	---	---	---	---	---
WmB---------------------- Wheeling	110	40	45	4.0	6.5	2,800
WpB**---------------------- Wheeling-Urban land	---	---	---	---	---	---
WyB---------------------- Wyatt	95	35	36	3.0	5.8	2,400
WyC2---------------------- Wyatt	90	25	27	2.6	5.5	2,300

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	81,574	43,358	38,216	---
III	32,349	31,120	1,229	---
IV	32,279	32,279	---	---
V	324	---	324	---
VI	102,791	101,953	---	838
VII	134,523	134,523	---	---
VIII	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
AfD: Alford	5R	Moderate	Moderate	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	72 104 70	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
BeC: Berks	4F	Slight	Slight	Moderate	Slight	Northern red oak Black oak Virginia pine Chestnut oak Scarlet oak Shortleaf pine	70 70 70 --- --- ---	52 52 109 --- --- ---	Virginia pine, eastern white pine, red pine.
BhD: Bethesda	---	--------	--------	--------	--------				Eastern white pine, red pine, black locust.
BrF**: Brownsville (north aspect)	4R	Moderate	Severe	Moderate	Slight	Northern red oak Yellow-poplar White oak Chestnut oak Scarlet oak Shortleaf pine	75 85 --- --- --- ---	57 81 --- --- --- ---	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
Rock outcrop.									
BrF**: Brownsville (south aspect)	3R	Moderate	Severe	Severe	Slight	Northern red oak Yellow-poplar White oak Chestnut oak Scarlet oak Shortleaf oak	65 75 --- --- --- ---	48 62 --- --- --- ---	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
Rock outcrop.									
CaF: Casco	4R	Severe	Severe	Moderate	Moderate	White oak Red pine Eastern white pine Jack pine	70 --- 85 68	52 --- 196 102	Eastern white pine, red pine, jack pine.
CoB: Coolville	4A	Slight	Slight	Slight	Slight	Black oak Yellow-poplar White oak Black cherry Sugar maple White ash	68 68 --- --- --- ---	50 51 --- --- --- ---	Eastern white pine, northern red oak, yellow-poplar, red pine, white ash, white oak.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
CpC**:									
Coolville	4A	Slight	Slight	Slight	Slight	Black oak Yellow-poplar White oak Black cherry Sugar maple White ash	68 68 --- --- --- ---	50 51 --- --- --- ---	Eastern white pine, northern red oak, yellow-poplar, red pine, white ash, white oak.
Rarden	4C	Slight	Slight	Severe	Severe	Black oak Northern red oak White ash Black cherry Slippery elm Red maple	71 62 --- --- --- ---	53 45 --- --- --- ---	Austrian pine, green ash, yellow-poplar, pin oak, red maple.
Cu Cuba	5A	Slight	Slight	Slight	Slight	White oak Yellow-poplar	90 100	72 107	Eastern white pine, black walnut, yellow-poplar, American sycamore, eastern cottonwood, white ash, white oak, pin oak.
DoA Doles	4A	Slight	Slight	Slight	Slight	White oak Northern red oak Yellow-poplar Black cherry Sugar maple White ash	75 80 --- --- --- ---	57 62 --- --- --- ---	Eastern white pine, yellow-poplar, white ash, red pine, white oak, pin oak, baldcypress.
EkB Elkinsville	5A	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	72 104 70	Eastern white pine, red pine, white ash, yellow-poplar, black walnut, American sycamore, eastern cottonwood, white ash, white oak, pin oak, black cherry.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
EkE------------- Elkinsville	5R	Moderate	Moderate	Slight	Slight	White oak----------- Yellow-poplar------- Sweetgum------------	90 98 76	72 104 70	Eastern white pine, red pine, white ash, yellow-poplar, black walnut, American sycamore, eastern cottonwood, white ash, white oak, pin oak, black cherry.
ErD------------- Ernest	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar------- White ash----------- Black walnut-------- Sugar maple--------- Black cherry--------	80 89 80 --- 80 ---	62 88 98 --- 50 ---	Eastern white pine, white oak, northern red oak, white ash.
FcA------------- Fitchville	5A	Slight	Slight	Slight	Slight	Pin oak------------- Northern red oak---- Yellow-poplar------- Sugar maple---------	90 80 --- ---	72 62 --- ---	Eastern white pine, white ash, green ash, yellow-poplar, white oak, northern red oak, black cherry, American sycamore, eastern cottonwood, baldcypress.
Ge-------------- Genesee	5A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar-------	90 100	72 107	Eastern white pine, black walnut, yellow-poplar, American sycamore, eastern cottonwood, white ash, white oak.
Ha-------------- Haymond	5A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar------- Black walnut--------	90 100 ---	72 107 ---	Eastern white pine, black walnut, yellow-poplar, American sycamore, eastern cottonwood, white ash, white oak.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
Hu-------------- Huntington	5A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	85 95	67 98	Yellow-poplar, black walnut, eastern white pine, American sycamore, eastern cottonwood, white ash, white oak.
La-------------- Landes	5A	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern cottonwood-- American sycamore--- Sweetgum------------ Green ash-----------	85 95 105 --- --- ---	67 98 141 --- --- ---	Eastern cottonwood, yellow-poplar, American sycamore, sweetgum, green ash, black walnut, eastern white pine, sugar maple.
LbC------------- Latham	3C	Slight	Slight	Moderate	Moderate	Northern red oak---- Black oak----------- Virginia pine------- Shortleaf pine------ White oak-----------	63 --- --- --- ---	46 --- --- --- ---	Virginia pine, white ash, eastern white pine, white oak, northern red oak.
LbD------------- Latham (north aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Black oak----------- Virginia pine------- White oak----------- Shortleaf pine------	68 --- --- --- ---	50 --- --- --- ---	Virginia pine, northern red oak, eastern white pine, white ash, white oak.
LbD------------- Latham (south aspect)	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Black oak----------- Virginia pine------- White oak----------- Shortleaf pine------	59 --- --- --- ---	42 --- --- --- ---	Northern red oak, Virginia pine, eastern white pine, white ash, white oak.
LcE**:									
Latham (north aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Black oak----------- Virginia pine------- White oak----------- Shortleaf pine------	68 --- --- --- ---	50 --- --- --- ---	Virginia pine, northern red oak, eastern white pine, white ash, white oak.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
LcE**: Brownsville (north aspect)	4R	Slight	Moderate	Moderate	Slight	Northern red oak	75	57	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Yellow-poplar	85	81	
						White oak	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Shortleaf pine	---	---	
Shelocta (north aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, black oak.
						White oak	72	54	
						Shortleaf pine	77	124	
						Yellow-poplar	99	105	
						Cucumbertree	---	---	
						American beech	---	---	
						Red maple	---	---	
LcE**: Latham (south aspect)	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak	59	42	Northern red oak, Virginia pine, eastern white pine, white ash, white oak.
						Black oak	---	---	
						Virginia pine	---	---	
						White oak	---	---	
						Shortleaf pine	---	---	
Brownsville (south aspect)	3R	Slight	Moderate	Moderate	Slight	Northern red oak	65	48	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Yellow-poplar	75	62	
						White oak	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Shortleaf pine	---	---	
Shelocta (south aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak	70	52	Shortleaf pine, white oak, eastern white pine, white ash, northern red oak.
						White oak	65	48	
						Scarlet oak	70	52	
						Yellow-poplar	---	---	
						American beech	---	---	
						Blackgum	---	---	
						Red maple	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
LgD**: Latham	3C	Slight	Slight	Moderate	Moderate	Northern red oak	63	46	Virginia pine, white ash, eastern white pine, white oak, northern red oak, black cherry.
						Black oak	---	---	
						Virginia pine	---	---	
						Shortleaf pine	---	---	
						White oak	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
LgD**:									
Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak	80	62	Virginia pine, eastern white pine, black cherry, yellow-poplar.
						Yellow-poplar	95	98	
						White oak	---	---	
						Black oak	---	---	
LsD**:									
Latham (north aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak	68	50	Virginia pine, northern red oak, eastern white pine, white ash, white oak.
						Black oak	---	---	
						Virginia pine	---	---	
						White oak	---	---	
						Shortleaf pine	---	---	
Steinsburg (north aspect)	4R	Moderate	Moderate	Moderate	Slight	Northern red oak	74	56	Eastern white pine, Virginia pine.
						Virginia pine	70	109	
						Yellow-poplar	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Shortleaf pine	---	---	
LsD**:									
Latham (south aspect)	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak	59	42	Northern red oak, Virginia pine, eastern white pine, white ash, white oak.
Steinsburg (south aspect)	3R	Moderate	Moderate	Moderate	Slight	Northern red oak	65	48	Eastern white pine, Virginia pine, yellow-poplar, black oak.
						Virginia pine	60	91	
						Yellow-poplar	---	---	
MoB, MoC2: Monongahela	4A	Slight	Slight	Slight	Slight	Northern red oak	70	52	Eastern white pine.
						Yellow-poplar	85	81	
						Eastern white pine	72	157	
						Virginia pine	66	102	
						White ash	---	---	
						Black walnut	---	---	
No: Nolin	5A	Slight	Slight	Slight	Slight	Northern red oak	90	72	Yellow-poplar, black walnut, red pine, white ash, eastern white pine, American sycamore, eastern cottonwood.
						Sweetgum	92	112	
						Yellow-poplar	107	119	
						Eastern cottonwood	---	---	
						American sycamore	---	---	
						River birch	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
OcB------------- Ockley	4A	Slight	Slight	Slight	Slight	White oak-----------	72	54	Eastern white pine, white ash, yellow-poplar, black walnut.
						Northern red oak----	72	54	
						Yellow-poplar-------	98	104	
						Sweetgum------------	76	70	
OmB, OmC-------- Omulga	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	62	Eastern white pine, black walnut, yellow-poplar, white ash, white oak, northern red oak, green ash, black cherry.
						White oak-----------	---	---	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
						Yellow-poplar-------	---	---	
Pe-------------- Peoga	5W	Slight	Severe	Severe	Moderate	Pin oak-------------	90	72	Eastern cottonwood, baldcypress, red maple, white ash, sweetgum, American sycamore, pin oak.
						White oak-----------	75	57	
						Sweetgum------------	90	106	
RbC------------- Rarden	4C	Slight	Slight	Severe	Severe	Black oak-----------	71	53	Austrian pine, green ash, yellow-poplar, pin oak, red maple.
						Northern red oak----	62	45	
						White ash-----------	---	---	
						Black cherry--------	---	---	
						Slippery elm--------	---	---	
						Red maple-----------	---	---	
Ro-------------- Rossburg	5A	Slight	Slight	Slight	Slight	White oak-----------	90	72	Black walnut, white oak, yellow-poplar, northern red oak, white ash, eastern white pine, green ash, black cherry, American sycamore, eastern cottonwood.
						Northern red oak----	---	---	
						Black walnut--------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	
						White ash-----------	---	---	
						Yellow-poplar-------	---	---	
SaB------------- Sardinia	5A	Slight	Slight	Slight	Slight	Northern red oak----	85	67	Eastern white pine, yellow-poplar, northern red oak, white oak, white ash, black cherry, pin oak.
						Yellow-poplar-------	95	98	
						White oak-----------	85	65	
						White ash-----------	---	---	
						Black cherry--------	---	---	
						Sugar maple---------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
SacB------------ Sciotoville	4A	Slight	Slight	Slight	Slight	Northern red oak----	80	62	Eastern white pine, yellow-poplar, white ash, white oak, northern red oak, green ash, black cherry, black locust, American sycamore, eastern cottonwood, pin oak.
						Yellow-poplar-------	90	90	
						Sugar maple---------	80	50	
						Eastern white pine--	90	211	
						Black cherry--------	---	---	
						White ash-----------	---	---	
						White oak-----------	---	---	
SbB, SbC-------- Shelcota	4A	Slight	Slight	Slight	Slight	Black oak-----------	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, black oak.
						White oak-----------	72	54	
						Shortleaf pine------	77	124	
						Yellow-poplar-------	99	105	
						Cucumbertree--------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	
SbD------------- Shelocta (north aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak-----------	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
						White oak-----------	72	54	
						Shortleaf pine------	77	124	
						Yellow-poplar-------	99	105	
						Cucumbertree--------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	
SbD------------- Shelocta (south aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak-----------	70	52	Shortleaf pine, eastern white pine, white oak, white ash, northern red oak.
						White oak-----------	65	48	
						Scarlet oak---------	70	52	
						Yellow-poplar-------	---	---	
						American beech------	---	---	
						Blackgum------------	---	---	
						Red maple-----------	---	---	
ScE**:									
Shelocta (north aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak-----------	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, black oak.
						White oak-----------	72	54	
						Shortleaf pine------	77	124	
						Yellow-poplar-------	99	105	
						Cucumbertree--------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant
ScE**: Brownsville (north aspect)	4R	Slight	Moderate	Moderate	Slight	Northern red oak	75	57	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Yellow-poplar	85	81	
						White oak	---	---	
ScE**: Shelocta (south aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak	70	52	Shortleaf pine, white oak, eastern white pine, white ash, northern red oak.
						White oak	65	48	
						Scarlet oak	70	52	
						Yellow-poplar	---	---	
						American beech	---	---	
						Blackgum	---	---	
						Red maple	---	---	
Brownsville (south aspect)	3R	Slight	Moderate	Moderate	Slight	Northern red oak	65	48	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Yellow-poplar	75	62	
						White oak	---	---	
ScF**: Shelocta (north aspect)	4R	Severe	Severe	Slight	Slight	Black oak	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak.
						White oak	72	54	
						Shortleaf pine	77	124	
						Yellow-poplar	99	105	
						Cucumbertree	---	---	
						American beech	---	---	
						Red maple	---	---	
Brownsville (north aspect)	4R	Moderate	Severe	Moderate	Slight	Northern red oak	75	57	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Yellow-poplar	85	81	
						White oak	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Shortleaf pine	---	---	
ScF**: Shelocta (south aspect)	4R	Severe	Severe	Moderate	Slight	Black oak	70	52	Shortleaf pine, white oak, eastern white pine, black oak.
						White oak	65	48	
						Scarlet oak	70	52	
						Yellow-poplar	---	---	
						American beech	---	---	
						Blackgum	---	---	
						Red maple	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ScF**:									
Brownsville (south aspect)	3R	Moderate	Severe	Severe	Slight	Northern red oak	65	48	Eastern white pine, red pine, Virginia pine, yellow-poplar, white ash, black oak.
						Yellow-poplar	75	62	
						White oak	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Shortleaf pine	---	---	
SeF**:									
Shelocta (north aspect)	4R	Severe	Severe	Slight	Slight	Black oak	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, black oak.
						White oak	72	54	
						Shortleaf pine	77	124	
						Yellow-poplar	99	105	
						Cucumbertree	---	---	
						American beech	---	---	
						Red maple	---	---	
Steinsburg (north aspect)	4R	Moderate	Severe	Moderate	Slight	Northern red oak	74	56	Eastern white pine, Virginia pine.
						Virginia pine	70	109	
						Yellow-poplar	---	---	
SeF**:									
Shelocta (south aspect)	4R	Severe	Severe	Moderate	Slight	Black oak	70	52	Shortleaf pine, white oak, eastern white pine.
						White oak	65	48	
						Scarlet oak	70	52	
						Yellow-poplar	---	---	
						American beech	---	---	
						Blackgum	---	---	
						Red maple	---	---	
Steinsburg (south aspect)	3R	Moderate	Severe	Moderate	Slight	Northern red oak	65	48	Eastern white pine, Virginia pine.
						Virginia pine	60	91	
						Yellow-poplar	---	---	
						Chestnut oak	---	---	
						Scarlet oak	---	---	
						Shortleaf pine	---	---	
SfE**:									
Shelocta (north aspect)	4R	Moderate	Moderate	Slight	Slight	Black oak	77	59	Yellow-poplar, black walnut, eastern white pine, shortleaf pine, white ash, white oak, northern red oak, black oak.
						White oak	72	54	
						Shortleaf pine	77	124	
						Yellow-poplar	99	105	
						Cucumbertree	---	---	
						American beech	---	---	
						Red maple	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
SfE**: Wharton (north aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	76 90	58 90	Eastern white pine, yellow-poplar, white oak, black oak.
Latham (north aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Black oak----------- Virginia pine------- White oak----------- Shortleaf pine------	68 --- --- --- ---	50 --- --- --- ---	Virginia pine, northern red oak, eastern white pine, white ash, white oak.
SfE**: Shelocta (south aspect)	4R	Moderate	Moderate	Moderate	Slight	Black oak----------- White oak----------- Scarlet oak--------- Yellow-poplar------- American beech------ Blackgum------------ Red maple-----------	70 65 70 --- --- --- ---	52 48 52 --- --- --- ---	Shortleaf pine, white oak, eastern white pine.
Wharton (south aspect)	4R	Moderate	Moderate	Moderate	Slight	Northern red oak---- Yellow-poplar-------	70 85	52 81	Eastern white pine, yellow-poplar, white oak, black oak.
Latham (south aspect)	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Black oak----------- Virginia pine------- White oak----------- Shortleaf pine------	59 --- --- --- ---	42 --- --- --- ---	Northern red oak, Virginia pine, eastern white pine, white ash, white oak.
Sk--------------- Skidmore	4A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar------- Sweetgum------------ American sycamore--- River birch--------- Eastern cottonwood-- Blackgum------------ Black oak----------- Black walnut--------	75 103 --- --- --- --- --- --- ---	57 112 --- --- --- --- --- --- ---	Yellow-poplar, white ash, eastern white pine, American sycamore, white oak, cherrybark oak, sweetgum, eastern cottonwood.
St--------------- Stendal	5A	Slight	Slight	Slight	Slight	Pin oak------------- Sweetgum------------ Yellow-poplar------- Virginia pine-------	90 85 90 90	72 93 90 135	Eastern cottonwood, baldcypress, American sycamore, red maple, white ash.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
TcB**:									
Tilsit	4A	Slight	Slight	Slight	Slight	White oak	68	50	Eastern white pine, shortleaf pine, white oak, yellow-poplar.
						Shortleaf pine	72	114	
						Yellow-poplar	90	90	
						Black oak	74	56	
						Virginia pine	73	113	
						Scarlet oak	74	56	
						Hickory	---	---	
						Red maple	---	---	
						Pitch pine	67	---	
						Southern red oak	65	48	
Coolville	4A	Slight	Slight	Slight	Slight	Black oak	68	50	Eastern white pine, northern red oak, yellow-poplar, white ash, white oak.
						Yellow-poplar	68	51	
						White oak	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
To: Tioga	4A	Slight	Slight	Slight	Slight	Northern red oak	75	57	Eastern white pine, yellow-poplar, black walnut, American sycamore, eastern cottonwood.
						Yellow-poplar	85	81	
						Sugar maple	67	41	
WeA: Weinbach	4D	Slight	Slight	Moderate	Moderate	White oak	75	57	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore, pin oak.
						Pin oak	88	70	
						Yellow-poplar	85	81	
						Sweetgum	88	101	
WfD: Wharton (north aspect)	4R	Moderate	Moderate	Slight	Slight	Northern red oak	76	58	Eastern white pine, yellow-poplar, white oak, black oak.
						Yellow-poplar	90	90	
WfD: Wharton (south aspect)	4R	Moderate	Moderate	Moderate	Slight	Northern red oak	70	52	Eastern white pine, yellow-poplar, white oak, black oak.
						Yellow-poplar	85	81	
WmB: Wheeling	4A	Slight	Slight	Slight	Slight	Northern red oak	80	62	Eastern white pine, yellow-poplar, black walnut, black cherry, white oak.
						Yellow-poplar	90	90	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
WyB, WyC2: Wyatt	4C	Slight	Slight	Severe	Severe	White oak White ash Slippery elm Red maple	70 --- --- ---	52 --- --- ---	Yellow-poplar, Austrian pine, green ash, pin oak, red maple, black oak, white oak, black cherry.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AfD--------------- Alford	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
BeC--------------- Berks	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
BhD. Bethesda					
BrF*:					
Brownsville------	Siberian peashrub	Eastern redcedar, Amur honeysuckle, radiant crabapple, lilac, Washington hawthorn, Tatarian honeysuckle, autumn-olive.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
Rock outcrop.					
CaF--------------- Casco	Siberian peashrub	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle, Tatarian honeysuckle.	Eastern white pine, red pine, Austrian pine, jack pine.	---	---
CoB--------------- Coolville	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
CpC*:					
Coolville	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Rarden	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Cu Cuba	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
DoA Doles	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
Dp*. Dumps					
EkB, EkE Elkinsville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
EmB*:					
Elkinsville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
Urban land.					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
ErD--------------- Ernest	---	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
FcA--------------- Fitchville	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce-----	Pin oak, eastern white pine.
Ge---------------- Genesee	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Ha---------------- Haymond	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Hu---------------- Huntington	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
La---------------- Landes	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
LbC, LbD---------- Latham	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
LcE*:					
Latham	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
Brownsville	Siberian peashrub	Eastern redcedar, Amur honeysuckle, radiant crabapple, lilac, Washington hawthorn, Tatarian honeysuckle, autumn-olive.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
Shelocta	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
LgD*:					
Latham	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
LsD*:					
Latham	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
LsD*: Steinsburg	Siberian peashrub	Eastern redcedar, Washington hawthorn, Tatarian honeysuckle, radiant crabapple, autumn-olive, lilac, Amur honeysuckle.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
MoB, MoC2: Monongahela	---	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
No: Nolin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
OcB: Ockley	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
OmB, OmC: Omulga	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
OpB*, OpC*: Omulga	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
Urban land.					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Pe------------- Peoga	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Po. Piopolis					
Ps*, Pt*. Pits					
RbC------------- Rarden	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Ro------------- Rossburg	---	Tatarian honeysuckle, Siberian peashrub.	Washington hawthorn, northern white-cedar, white spruce, green ash, osageorange, eastern redcedar, nannyberry viburnum.	Black willow------	---
SaB------------- Sardinia	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
SacB------------- Sciotoville	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
SbB, SbC, SbD----- Shelocta	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
ScE*, ScF*:					
Shelocta	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
Brownsville	Siberian peashrub	Eastern redcedar, Amur honeysuckle, radiant crabapple, lilac, Washington hawthorn, Tatarian honeysuckle, autumn-olive.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
SeF*:					
Shelocta	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
Steinsburg	Siberian peashrub	Eastern redcedar, Washington hawthorn, Tatarian honeysuckle, radiant crabapple, autumn-olive, lilac, Amur honeysuckle.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
SfE*:					
Shelocta	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Northern white-cedar, white fir, Washington hawthorn, blue spruce.	Austrian pine, Norway spruce.	Eastern white pine, pin oak.
Wharton	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Norway spruce	Austrian pine, pin oak, eastern white pine.
Latham	---	American cranberrybush, Tatarian honeysuckle, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osageorange, green ash, Austrian pine.	Pin oak, eastern white pine.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Sk: Skidmore	Siberian peashrub	Eastern redcedar, Amur honeysuckle, radiant crabapple, lilac, Washington hawthorn, Tatarian honeysuckle, autumn-olive.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
St: Stendal	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
TcB*:					
Tilsit	---	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
Coolville	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
To: Tioga	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
WeA: Weinbach	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
WfD--------------- Wharton	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
WkD*:					
Wharton----------	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
Urban land.					
WmB--------------- Wheeling	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
WpB*:					
Wheeling---------	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
Urban land.					
WyB, WyC2--------- Wyatt	---	Eastern redcedar, arrowwood, Tatarian honeysuckle, Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet.	Osageorange, Austrian pine, green ash.	Eastern white pine, pin oak.	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AfD: Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
BeC: Berks	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
BhD: Bethesda	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, droughty, slope.
BrF*:					
Brownsville	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.					
CaF: Casco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CoB: Coolville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
CpC*:					
Coolville	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
Rarden	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Cu: Cuba	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
DoA: Doles	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Dp*. Dumps					
EkB: Elkinsville	Slight**	Slight	Moderate: slope.	Slight	Slight.
EkE: Elkinsville	Severe**: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
EmB*:					
Elkinsville	Slight**	Slight	Moderate: slope.	Slight	Slight.
Urban land.					

See footnotes at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ErD------------------ Ernest	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
FcA------------------ Fitchville	Severe**: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Ge------------------- Genesee	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
Ha------------------- Haymond	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
Hu------------------- Huntington	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
La------------------- Landes	Severe: flooding.	Slight----------	Moderate: slope, flooding.	Slight----------	Moderate: flooding, droughty.
LbC------------------ Latham	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope, depth to rock.
LbD------------------ Latham	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
LcE*:					
Latham---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Brownsville----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Shelocta-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LgD*:					
Latham---------------	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope, depth to rock.
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
LsD*:					
Latham---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Steinsburg-----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MoB------------------ Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Slight.

See footnotes at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MoC2------------------ Monongahela	Moderate: wetness, slope.	Moderate: slope, wetness.	Slope-----------	Severe: erodes easily.	Moderate: slope.
No------------------- Nolin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
OcB------------------ Ockley	Slight**--------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
OmB------------------ Omulga	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
OmC------------------ Omulga	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
OpB*:					
Omulga---------------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
Urban land.					
OpC*:					
Omulga---------------	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Urban land.					
Pe------------------- Peoga	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Po------------------- Piopolis	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Ps*, Pt*. Pits					
RbC------------------ Rarden	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
Ro------------------- Rossburg	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
SaB------------------ Sardinia	Moderate**: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness.

See footnotes at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SacB------------------ Sciotoville	Moderate**: wetness.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Moderate: wetness.
SbB------------------- Shelocta	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
SbC------------------- Shelocta	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
SbD------------------- Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
ScE*, ScF*:					
Shelocta-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Brownsville----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
SeF*:					
Shelocta-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Steinsburg-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SfE*:					
Shelocta-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wharton--------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Latham---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Sk-------------------- Skidmore	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight----------	Moderate: droughty, flooding.
St-------------------- Stendal	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
TcB*:					
Tilsit---------------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Coolville------------	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
To-------------------- Tioga	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.

See footnotes at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WeA Weinbach	Severe**: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
WfD Wharton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
WkD*:					
Wharton	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, small stones.	Slight	Moderate: slope, wetness.
Urban land.					
WmB Wheeling	Slight**	Slight	Moderate: slope.	Slight	Slight.
WpB*:					
Wheeling	Slight**	Slight	Moderate: slope.	Slight	Slight.
Urban land.					
WyB Wyatt	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
WyC2 Wyatt	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.
** Included in mapping are small areas that are subject to rare flooding.

TABLE 11.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AfD---------------- Alford	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BeC---------------- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
BhD---------------- Bethesda	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
BrF*: Brownsville--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
CaF---------------- Casco	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CoB---------------- Coolville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CpC*: Coolville---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rarden------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Cu----------------- Cuba	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DoA---------------- Doles	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Dp*. Dumps										
EkB---------------- Elkinsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EkE---------------- Elkinsville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
EmB*: Elkinsville-------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
ErD---------------- Ernest	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FcA---------------- Fitchville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ge-----------------Genesee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ha-----------------Haymond	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
Hu-----------------Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
La-----------------Landes	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LbC----------------Latham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LbD----------------Latham	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LcE*:										
Latham------------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Brownsville--------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Shelocta----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LgD*:										
Latham------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Gilpin------------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
LsD*:										
Latham------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Steinsburg--------	Poor	Fair	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
MoB----------------Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoC2---------------Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
No-----------------Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OcB----------------Ockley	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmB----------------Omulga	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OmC----------------Omulga	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
OpB*:										
Omulga	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
OpC*:										
Omulga	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
Pe Peoga	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Po Piopolis	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Ps*, Pt*. Pits										
RbC Rarden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ro Rossburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SaB Sardinia	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SacB Sciotoville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SbB Shelocta	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SbC Shelocta	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SbD Shelocta	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ScE*:										
Shelocta	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Brownsville	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
ScF*:										
Shelocta	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Brownsville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
SeF*:										
Shelocta	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
SeF*:										
Steinsburg	Very poor.	Poor	Good	Good	---	Very poor.	Very poor.	Poor	Fair	Very poor.
SfE*:										
Shelocta	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wharton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Latham	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Sk Skidmore	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
St Stendal	Fair	Good	Fair	Good	Good	Good	Fair	Fair	Good	Fair.
TcB*:										
Tilsit	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Coolville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
To Tioga	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WeA Weinbach	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
WfD Wharton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WkD*:										
Wharton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
WmB Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WpB*:										
Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
WyB Wyatt	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WyC2 Wyatt	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AfD---------------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
BeC---------------- Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
BhD---------------- Bethesda	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
BrF*: Brownsville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.						
CaF---------------- Casco	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CoB---------------- Coolville	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
CpC*: Coolville---------	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Rarden------------	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: slope, depth to rock.
Cu----------------- Cuba	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
DoA---------------- Doles	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Dp*. Dumps						
EkB---------------- Elkinsville	Slight----------	Moderate**: shrink-swell.	Moderate**: shrink-swell.	Moderate**: shrink-swell, slope.	Severe**: low strength, frost action.	Slight.

See footnotes at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EkE: Elkinsville	Severe: slope.	Severe**: slope.	Severe**: slope.	Severe**: slope.	Severe**: low strength, slope, frost action.	Severe: slope.
EmB*:						
Elkinsville	Slight	Moderate**: shrink-swell.	Moderate**: shrink-swell.	Moderate**: shrink-swell, slope.	Severe**: low strength, frost action.	Slight.
Urban land.						
ErD: Ernest	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FcA: Fitchville	Severe: wetness.	Severe**: wetness.	Severe**: wetness.	Severe**: wetness.	Severe**: low strength, frost action.	Moderate: wetness.
Ge: Genesee	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Ha: Haymond	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
Hu: Huntington	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
La: Landes	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, droughty.
LbC: Latham	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness, slope, depth to rock.
LbD: Latham	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
LcE*:						
Latham	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
Brownsville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnotes at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LgD*:						
Latham	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness, slope, depth to rock.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LsD*:						
Latham	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
Steinsburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MoB Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Slight.
MoC2 Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength, wetness.	Moderate: slope.
No Nolin	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
OcB Ockley	Severe: cutbanks cave.	Moderate**: shrink-swell.	Moderate**: shrink-swell.	Moderate**: shrink-swell, slope.	Moderate**: low strength, frost action.	Slight.
OmB Omulga	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
OmC Omulga	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
OpB*:						
Omulga	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
Urban land.						
OpC*:						
Omulga	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Urban land.						

See footnotes at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pe----------------- Peoga	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
Po----------------- Piopolis	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
Ps*, Pt*. Pits						
RbC---------------- Rarden	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: slope, depth to rock.
Ro----------------- Rossburg	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
SaB---------------- Sardinia	Severe: wetness.	Moderate**: wetness, shrink-swell.	Severe**: wetness.	Moderate**: wetness, shrink-swell, slope.	Severe**: low strength, frost action.	Moderate: wetness.
SacB--------------- Sciotoville	Severe: wetness.	Moderate**: wetness.	Severe**: wetness.	Moderate**: wetness, slope.	Severe**: frost action.	Moderate: wetness.
SbB---------------- Shelocta	Moderate: depth to rock.	Slight----------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Slight.
SbC---------------- Shelocta	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
SbD---------------- Shelocta	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ScE*, ScF*:						
Shelocta----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Brownsville-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
SeF*:						
Shelocta----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Steinsburg--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SfE*:						
Shelocta----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnotes at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SfE*:						
Wharton----------	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
Latham-----------	Severe: wetness, slope.	Severe: shrink-swell, slope.	Severe: wetness, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, frost action.	Severe: slope.
Sk---------------- Skidmore	Moderate: depth to rock, wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
St---------------- Stendal	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
TcB*:						
Tilsit-----------	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength, frost action.	Moderate: wetness.
Coolville--------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
To---------------- Tioga	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
WeA--------------- Weinbach	Severe: cutbanks cave, wetness.	Severe**: wetness.	Severe**: wetness.	Severe**: wetness.	Severe**: low strength, frost action.	Moderate: wetness.
WfD--------------- Wharton	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
WkD*:						
Wharton----------	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope, wetness.
Urban land.						
WmB--------------- Wheeling	Slight---------	Slight**-------	Slight**-------	Moderate**: slope.	Moderate**: frost action, low strength.	Slight.
WpB*:						
Wheeling---------	Slight---------	Slight**-------	Slight**-------	Moderate**: slope.	Moderate**: frost action, low strength.	Slight.
Urban land.						

See footnotes at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WyB--------------- Wyatt	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
WyC2-------------- Wyatt	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.
** Included in mapping are small areas that are subject to rare flooding.

TABLE 13.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AfD----------------- Alford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
BeC----------------- Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
BhD----------------- Bethesda	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
BrF*:					
Brownsville--------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Rock outcrop.					
CaF----------------- Casco	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: slope, seepage.	Poor: too sandy, seepage, small stones.
CoB----------------- Coolville	Severe: wetness, percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
CpC*:					
Coolville----------	Severe: wetness, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness, slope.	Poor: too clayey, hard to pack.
Rarden-------------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Cu------------------ Cuba	Severe: flooding.	Severe: flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: too sandy.
DoA----------------- Doles	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Dp*. Dumps					
EkB----------------- Elkinsville	Slight**----------	Moderate: seepage, slope.	Moderate**: too clayey.	Slight**----------	Fair: too clayey.

See footnotes at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EkE----------------- Elkinsville	Severe**: slope.	Severe: slope.	Severe**: slope.	Severe**: slope.	Poor: slope.
EmB*:					
Elkinsville--------	Slight**---------	Moderate: seepage, slope.	Moderate**: too clayey.	Slight**---------	Fair: too clayey.
Urban land.					
ErD----------------- Ernest	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
FcA----------------- Fitchville	Severe**: wetness, percs slowly.	Severe: wetness.	Severe**: wetness.	Severe**: wetness.	Poor: wetness.
Ge------------------ Genesee	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Ha------------------ Haymond	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Hu------------------ Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
La------------------ Landes	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
LbC----------------- Latham	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
LbD----------------- Latham	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
LcE*:					
Latham-------------	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Brownsville--------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Shelocta-----------	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LgD*:					
Latham	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
LsD*:					
Latham	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Steinsburg	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, thin layer.
MoB Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
MoC2 Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.
No Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
OcB Ockley	Slight**	Severe: seepage.	Severe**: seepage.	Slight**	Poor: small stones.
OmB Omulga	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
OmC Omulga	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
OpB*:					
Omulga	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
Urban land.					
OpC*:					
Omulga	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Urban land.					

See footnotes at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pe: Peoga	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Po: Piopolis	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
Ps*, Pt*. Pits					
RbC: Rarden	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Ro: Rossburg	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding.	Good.
SaB: Sardinia	Severe**: wetness.	Severe: wetness.	Severe**: seepage, wetness.	Moderate**: wetness.	Fair: too clayey, wetness.
SacB: Sciotoville	Severe**: wetness, percs slowly.	Severe: seepage, wetness.	Severe**: seepage, wetness.	Moderate**: wetness.	Fair: too clayey, wetness.
SbB: Shelocta	Moderate: depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Moderate: depth to rock.	Fair: too clayey, small stones.
SbC: Shelocta	Moderate: depth to rock, slope.	Severe: seepage, slope.	Severe: depth to rock, seepage.	Moderate: depth to rock, slope.	Fair: too clayey, small stones, slope.
SbD: Shelocta	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.
ScE*, ScF*:					
Shelocta	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.
Brownsville	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
SeF*:					
Shelocta	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.

See footnotes at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SeF*:					
Steinsburg	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, thin layer.
SfE*:					
Shelocta	Severe: slope.	Severe: seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: slope.	Poor: slope.
Wharton	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope.
Latham	Severe: depth to rock, wetness, percs slowly.	Severe: depth to rock, slope, wetness.	Severe: depth to rock, wetness, slope.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Sk: Skidmore	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, depth to rock, seepage.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones.
St: Stendal	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
TcB*:					
Tilsit	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey.
Coolville	Severe: wetness, percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
To: Tioga	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: thin layer.
WeA: Weinbach	Severe**: wetness, percs slowly.	Slight	Severe**: wetness.	Severe**: wetness.	Poor: wetness.
WfD: Wharton	Severe: slope, percs slowly, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope.
WkD*:					
Wharton	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Fair: slope, too clayey.
Urban land.					

See footnotes at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WmB----------------- Wheeling	Slight**---------	Severe: seepage.	Severe**: seepage.	Slight**---------	Fair: thin layer.
WpB*:					
Wheeling-----------	Slight**---------	Severe: seepage.	Severe**: seepage.	Slight**---------	Fair: thin layer.
Urban land.					
WyB----------------- Wyatt	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
WyC2---------------- Wyatt	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.

* See description of the map unit for composition and behavior characteristics of the map unit.
** Included in mapping are small areas that are subject to rare flooding.

TABLE 14.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AfD: Alford	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
BeC: Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BhD: Bethesda	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
BrF*:				
Brownsville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
CaF: Casco	Poor: slope.	Probable	Probable	Poor: slope, area reclaim, small stones.
CoB: Coolville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
CpC*:				
Coolville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Rarden	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Cu: Cuba	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
DoA: Doles	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dp*. Dumps				
EkB: Elkinsville	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
EkE: Elkinsville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
EmB*:				
Elkinsville	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land.				

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ErD------------------- Ernest	Fair: low strength, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
FcA------------------- Fitchville	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ge-------------------- Genesee	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Ha-------------------- Haymond	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Good.
Hu-------------------- Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
La-------------------- Landes	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: thin layer.
LbC------------------- Latham	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
LbD------------------- Latham	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
LcE*:				
Latham---------------	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Brownsville----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Shelocta-------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
LgD*:				
Latham---------------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Gilpin---------------	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
LsD*:				
Latham---------------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LsD*:				
Steinsburg	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
MoB Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MoC2 Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
No Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OcB Ockley	Good	Probable	Probable	Poor: small stones, area reclaim.
OmB Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
OmC Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
OpB*:				
Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Urban land.				
OpC*:				
Omulga	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Urban land.				
Pe Peoga	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Po Piopolis	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ps*, Pt*. Pits				
RbC Rarden	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Ro Rossburg	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
SaB Sardinia	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SacB: Sciotoville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
SbB, SbC: Shelocta	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
SbD: Shelocta	Fair: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
ScE*, ScF*:				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Brownsville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
SeF*:				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Steinsburg	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
SfE*:				
Shelocta	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Wharton	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
Latham	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Sk: Skidmore	Fair: area reclaim.	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
St: Stendal	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
TcB*:				
Tilsit	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TcB*:				
Coolville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
To Tioga	Good	Probable	Probable	Poor: small stones, area reclaim.
WeA Weinbach	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
WfD Wharton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
WkD*:				
Wharton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land.				
WmB Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.
WpB*:				
Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.
Urban land.				
WyB, WyC2 Wyatt	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AfD: Alford	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
BeC: Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
BhD: Bethesda	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
BrF*:						
Brownsville	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Rock outcrop.						
CaF: Casco	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Droughty, slope.
CoB: Coolville	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
CpC*:						
Coolville	Severe: slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Rarden	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Cu: Cuba	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
DoA: Doles	Slight	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
Dp*. Dumps						
EkB: Elkinsville	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
EkE: Elkinsville	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
EmB*:						
Elkinsville	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Urban land.						
ErD Ernest	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, rooting depth.	Rooting depth, slope, erodes easily.
FcA Fitchville	Moderate: seepage.	Severe: piping.	Severe: no water.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Ge Genesee	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Ha Haymond	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
Hu Huntington	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Favorable	Favorable.
La Landes	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Droughty.
LbC, LbD Latham	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
LcE*:						
Latham	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Brownsville	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Shelocta	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
LgD*:						
Latham	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
LsD*:						
Latham	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
LsD*:						
Steinsburg	Severe: seepage, slope.	Moderate: thin layer, piping, seepage.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, droughty, depth to rock.
MoB Monongahela	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
MoC2 Monongahela	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
No Nolin	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
OcB Ockley	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
OmB Omulga	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
OmC Omulga	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
OpB*:						
Omulga	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Urban land.						
OpC*:						
Omulga	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Urban land.						
Pe Peoga	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Po Piopolis	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Ps*, Pt*. Pits						
RbC Rarden	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Ro----------------- Rossburg	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
SaB---------------- Sardinia	Moderate: seepage, slope.	Moderate: piping, wetness.	Severe: no water.	Frost action, slope.	Erodes easily, wetness.	Erodes easily.
SacB--------------- Sciotoville	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
SbB---------------- Shelocta	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
SbC, SbD----------- Shelocta	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
ScE*, ScF*:						
Shelocta----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Brownsville-------	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
SeF*:						
Shelocta----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Steinsburg--------	Severe: seepage, slope.	Moderate: thin layer, piping, seepage.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, droughty, depth to rock.
SfE*:						
Shelocta----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Wharton-----------	Severe: slope.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, slope, percs slowly.	Slope, percs slowly.
Latham------------	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, depth to rock, frost action.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Sk----------------- Skidmore	Severe: seepage.	Severe: seepage.	Moderate: deep to water, depth to rock.	Deep to water	Large stones---	Large stones, droughty.
St----------------- Stendal	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
TcB*:						
Tilsit	Moderate: depth to rock, seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Coolville	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
To Tioga	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Erodes easily	Erodes easily, droughty.
WeA Weinbach	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
WfD Wharton	Severe: slope.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, slope, percs slowly.	Slope, percs slowly.
WkD*:						
Wharton	Severe: slope.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, slope, percs slowly.	Slope, percs slowly.
Urban land.						
WmB Wheeling	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
WpB*:						
Wheeling	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
Urban land.						
WyB Wyatt	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
WyC2 Wyatt	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AfD-------------- Alford	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
	10-70	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
BeC-------------- Berks	0-8	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	8-22	Channery loam, very channery silt loam, extremely flaggy silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	22-28	Extremely flaggy silt loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	28-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
BhD-------------- Bethesda	0-6	Very shaly clay loam.	GC, GM	A-6, A-7, A-2	5-25	55-70	35-50	30-50	25-45	35-50	12-24
	6-60	Extremely shaly clay loam, very channery clay loam, channery sandy loam.	GM, GC, ML, CL	A-4, A-6, A-7, A-2	10-30	45-80	25-65	25-65	20-60	24-50	3-23
BrF*:											
Brownsville-----	0-3	Channery silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-15	50-80	45-70	40-70	35-60	25-35	5-10
	3-43	Channery silt loam, extremely channery silt loam, very channery silt loam.	ML, CL-ML, GM, GM-GC	A-1, A-2, A-4	5-40	35-80	30-70	25-70	20-60	25-35	5-10
	43-60	Channery silt loam, extremely channery silt loam, very flaggy loam.	GM, GP-GM, SM, SP-SM	A-1, A-2, A-4	15-60	25-65	20-55	15-50	10-45	20-35	2-10
Rock outcrop.											
CaF-------------- Casco	0-4	Loam-------------	ML, CL-ML, CL	A-4	0	95-100	90-100	75-100	55-90	20-30	3-10
	4-20	Clay loam, sandy clay loam, gravelly clay loam.	SC, CL, GC	A-6, A-7, A-2	0-5	60-100	55-100	45-100	20-80	25-46	11-26
	20-60	Stratified sand to gravel.	GP, SP, GP-GM, SP-SM	A-1, A-3, A-2	0-10	30-100	30-100	10-95	2-10	---	NP
CoB-------------- Coolville	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	80-100	70-95	24-40	4-12
	8-18	Silty clay loam	CL, ML	A-7, A-6	0	95-100	85-100	80-100	75-95	35-50	15-25
	18-35	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7, A-6	0-5	95-100	85-100	80-100	75-95	35-65	14-36
	35-45	Clay, silty clay, shaly silty clay loam.	CH, MH, CL	A-7	0-5	95-100	85-100	80-100	75-95	45-65	20-36
	45-50	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CpC*:											
Coolville	0-8	Silt loam	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	80-100	70-95	24-40	4-12
	8-14	Silty clay loam	CL, ML	A-7, A-6	0	95-100	85-100	80-100	75-95	35-50	15-25
	14-29	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7, A-6	0-5	95-100	85-100	80-100	75-95	35-65	14-36
	29-43	Clay, silty clay, shaly silty clay loam.	CH, MH, CL	A-7	0-5	95-100	85-100	80-100	75-95	45-65	20-36
	43-45	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rarden	0-8	Silt loam	ML, CL-ML, CL	A-4, A-6	0	100	85-100	80-100	75-95	25-40	4-15
	8-32	Silty clay, clay, channery silty clay.	CH	A-7	0-5	90-100	85-100	85-100	80-100	50-70	25-40
	32-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cu: Cuba	0-11	Silt loam	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-90	25-35	3-12
	11-60	Stratified silt loam to fine sand.	CL, ML, CL-ML	A-4	0	100	80-100	75-100	50-85	15-30	2-10
DoA: Doles	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-90	20-35	3-15
	8-20	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	100	100	90-100	70-95	25-45	5-20
	20-53	Silt loam, silty clay loam.	CL, ML	A-6	0	100	100	90-100	75-100	30-40	10-20
	53-62	Silt loam, silty clay loam.	CL, ML	A-6, A-7	0	100	100	90-100	75-100	30-45	10-25
Dp*. Dumps											
EkB: Elkinsville	0-10	Silt loam	CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-7
	10-60	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	85-100	65-90	20-35	7-15
	60-70	Silty clay loam, sandy loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	90-100	60-100	40-80	20-35	5-15
EkE: Elkinsville	0-5	Silt loam	CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-7
	5-50	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	85-100	65-90	20-35	7-15
	50-64	Silty clay loam, sandy loam, silt loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	90-100	60-100	40-80	20-35	5-15
EmB*:											
Elkinsville	0-10	Silt loam	CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-7
	10-60	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	85-100	65-90	20-35	7-15
	60-70	Silty clay loam, sandy loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	90-100	60-100	40-80	20-35	5-15
Urban land.											

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ErD-------------- Ernest	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-10	85-100	80-100	70-95	60-95	20-40	4-15
	5-24	Silty clay loam, silt loam, channery silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-15	75-95	70-100	65-90	55-90	25-50	6-22
	24-60	Loam, channery loam, silty clay loam.	ML, CL, GM, SC	A-4, A-6, A-7	0-20	70-95	55-95	55-90	45-90	20-45	4-18
FcA-------------- Fitchville	0-10	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	24-40	4-16
	10-55	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	100	90-100	80-100	28-50	5-23
	55-80	Silt loam, clay loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	60-100	20-40	3-18
Ge--------------- Genesee	0-8	Silt loam--------	ML, CL	A-4, A-6	0	100	100	90-100	75-90	26-40	3-15
	8-60	Silt loam, loam	ML, CL	A-4, A-6	0	100	100	90-100	75-90	26-40	3-15
	60-82	Stratified sandy loam to silt loam.	ML, CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	50-90	20-35	3-15
Ha--------------- Haymond	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-57	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	57-78	Sandy loam, silt loam, loam.	ML, SM	A-4	0	95-100	90-100	80-100	35-90	27-36	4-10
Hu--------------- Huntington	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	12-58	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	58-60	Stratified fine sand to silty clay loam.	SM, SC, ML, CL	A-2, A-4	0-10	95-100	60-100	50-90	30-75	<30	NP-10
La--------------- Landes	0-11	Fine sandy loam	SM, SC, SM-SC	A-4, A-2	0	100	70-100	70-95	20-50	<25	NP-10
	11-60	Stratified sand to silt loam.	SM, SP-SM, SC, SM-SC	A-2, A-4	0	100	85-100	70-95	10-50	<30	NP-10
LbC, LbD--------- Latham	0-5	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	5-38	Silty clay, silty clay loam, channery silt loam.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	38-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
LcE*: Latham----------	0-3	Silt loam--------	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	3-36	Silty clay, silty clay loam, channery silt loam.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	36-40	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LcE*:											
Brownsville	0-6	Channery silt loam.	ML, CL-ML, GM, GM-GC	A-4	0-15	50-80	45-70	40-70	35-60	25-35	5-10
	6-41	Channery silt loam, extremely channery silt loam, very channery silt loam.	ML, CL-ML, GM, GM-GC	A-1, A-2, A-4	5-40	35-80	30-70	25-70	20-60	25-35	5-10
	41-60	Channery silt loam, extremely channery silt loam, very flaggy loam.	GM, GP-GM, SM, SP-SM	A-1, A-2, A-4	15-60	25-65	20-55	15-50	10-45	20-35	2-10
Shelocta	0-3	Silt loam	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	3-55	Silty clay loam, silt loam, channery silty clay loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-100	25-40	4-15
	55-60	Very channery silt loam, channery silty clay loam, very channery clay loam.	GM, GC, ML, CL	A-4, A-6, A-2, A-1-b	0-15	40-85	35-70	25-70	20-65	20-40	3-20
	60-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LgD*:											
Latham	0-3	Silt loam	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	3-33	Silty clay, silty clay loam, channery silt loam.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	33-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin	0-5	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-24	Loam, silt loam, clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	24-28	Clay loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-95	15-45	15-40	20-40	4-15
	28-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LsD*:											
Latham	0-5	Silt loam	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	5-38	Silty clay, silty clay loam, channery silt loam.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	38-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
Steinsburg	0-8	Sandy loam	ML, SM	A-4	0-5	95-100	90-100	65-90	35-70	<25	5-10
	8-16	Loam, gravelly fine sandy loam, sandy loam.	SM, SM-SC	A-2, A-4, A-1	0-10	75-95	65-95	35-60	15-40	<25	NP-5
	16-33	Sandy loam, very gravelly loamy sand.	SM, GM	A-2, A-1	10-40	45-85	40-95	35-60	15-35	<25	NP-3
	33-43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MoB, MoC2-------- Monongahela	0-6	Silt loam--------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	6-18	Silt loam, loam, gravelly clay loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	18-57	Loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	57-70	Silt loam, sandy clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
No--------------- Nolin	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	11-66	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
OcB-------------- Ockley	0-15	Loam-------------	CL, ML, CL-ML	A-4	0	95-100	85-100	70-100	50-90	15-30	3-10
	15-27	Silty clay loam, clay loam, silt loam.	CL	A-6, A-4	0	90-100	80-100	70-90	55-90	25-40	8-15
	27-51	Gravelly clay loam, gravelly sandy clay loam.	CL, SC	A-6, A-4, A-2	0-2	70-85	45-85	40-70	25-55	25-40	8-15
	51-74	Stratified sand to very gravelly loamy coarse sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	20-55	10-40	2-10	---	NP
OmB, OmC--------- Omulga	0-10	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	65-90	25-35	5-15
	10-30	Silty clay loam, silt loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	95-100	90-100	85-100	65-100	25-45	5-20
	30-43	Silty clay loam, silt loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	85-100	80-100	75-95	60-90	20-40	5-20
	43-50	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	85-100	80-100	75-95	70-90	20-45	5-20
	50-85	Stratified sandy loam to clay.	CL	A-6, A-7	0	80-100	75-100	65-95	50-90	30-50	15-30
OpB*, OpC*: Omulga----------	0-10	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	85-100	65-90	25-35	5-15
	10-30	Silty clay loam, silt loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	95-100	90-100	85-100	65-100	25-45	5-20
	30-43	Silty clay loam, silt loam, clay loam.	CL, CL-ML, ML	A-6, A-4	0	85-100	80-100	75-95	60-90	20-40	5-20
	43-50	Silty clay loam, silt loam.	CL, CL-ML, ML	A-6, A-7, A-4	0	85-100	80-100	75-95	70-90	20-45	5-20
	50-85	Stratified sandy loam to clay.	CL	A-6, A-7	0	80-100	75-100	65-95	50-90	30-50	15-30
Urban land.											
Pe--------------- Peoga	0-15	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	15-49	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	20-30
	49-82	Stratified silty clay loam to silt loam.	CL, ML	A-6, A-7	0	100	100	90-100	70-95	35-50	10-25

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Po--------------- Piopolis	0-5	Silt loam--------	CL-ML, CL	A-4, A-6	0	90-100	95-100	90-100	75-90	25-40	5-15
	5-60	Silty clay loam	CL	A-6, A-7	0	90-100	95-100	90-100	85-95	35-50	15-25
Ps*, Pt*. Pits											
RbC-------------- Rarden	0-6	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	85-100	80-100	75-95	25-40	4-15
	6-32	Silty clay, clay, channery silty clay.	CH	A-7	0-5	90-100	85-100	85-100	80-100	50-70	25-40
	32-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ro--------------- Rossburg	0-15	Silty clay loam	CL	A-6	0	95-100	90-100	85-100	80-100	30-40	10-15
	15-44	Silt loam, loam, fine sandy loam.	CL-ML, CL, ML	A-4, A-6	0	90-100	85-100	70-95	50-80	20-35	5-15
	44-80	Stratified silt loam to gravelly sand.	SM, SC, ML, CL	A-4, A-2-4	0	80-100	70-100	45-90	25-70	<25	NP-10
SaB-------------- Sardinia	0-10	Silt loam--------	ML, CL-ML	A-4	0	90-100	85-100	75-95	60-85	25-35	3-10
	10-75	Silty clay loam, silt loam, loam.	ML, CL	A-6, A-7	0	90-100	85-100	80-100	65-100	30-50	10-20
	75-80	Clay loam, silty clay loam, silt loam.	CL, SC, ML, GC	A-6, A-2, A-4	0	65-100	50-100	45-95	25-85	25-40	5-20
SacB------------- Sciotoville	0-13	Silt loam--------	CL-ML, ML	A-4	0	95-100	95-100	90-100	65-95	25-35	4-10
	13-34	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-90	20-35	4-15
	34-59	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0-5	95-100	90-100	85-100	65-90	25-40	4-18
	59-69	Stratified silty clay loam to sandy loam.	ML, CL, SM, SC	A-4, A-6	0-15	75-100	75-100	65-100	45-70	5-35	NP-15
SbB, SbC, SbD---- Shelocta	0-9	Silt loam--------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	9-60	Silty clay loam, silt loam, very channery silt loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-100	25-40	4-15
ScE*, ScF*: Shelocta--------	0-9	Silt loam--------	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	9-60	Silty clay loam, silt loam, very channery silt loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-100	25-40	4-15
Brownsville-----	0-3	Silt loam--------	ML, CL-ML, CL	A-4	0-5	85-100	80-95	70-95	55-85	25-35	5-10
	3-43	Channery silt loam, extremely channery silt loam, very channery silt loam.	ML, CL-ML, GM, GM-GC	A-1, A-2, A-4	5-40	35-80	30-70	25-70	20-60	25-35	5-10
	43-60	Channery silt loam, extremely channery silt loam, very flaggy loam.	GM, GP-GM, SM, SP-SM	A-1, A-2, A-4	15-60	25-65	20-55	15-50	10-45	20-35	2-10

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SeF*:											
Shelocta	0-9	Silt loam	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	9-60	Silty clay loam, silt loam, very channery silt loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-100	25-40	4-15
Steinsburg	0-5	Sandy loam	ML, SM	A-4	0-5	95-100	90-100	65-90	35-70	<25	5-10
	5-28	Loam, gravelly fine sandy loam, sandy loam.	SM, SM-SC	A-2, A-4, A-1	0-10	75-95	65-85	35-60	15-40	<25	NP-5
	28-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
SfE*:											
Shelocta	0-6	Silt loam	ML, CL-ML	A-4	0-5	80-95	75-95	60-95	55-90	<35	NP-10
	6-68	Silty clay loam, silt loam, very channery silt loam.	CL, CL-ML, GC, SC	A-6, A-4	0-10	55-95	50-95	45-95	40-100	25-40	4-15
Wharton	0-5	Silt loam	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90	---	---
	5-60	Channery silt loam, silty clay loam, silt loam.	ML, CL	A-7, A-6	0-25	75-100	70-100	65-95	60-90	35-45	10-25
Latham	0-9	Silt loam	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	70-100	65-90	20-35	5-12
	9-33	Silty clay, silty clay loam, channery silt loam.	CH, CL	A-7	0-10	85-100	70-95	65-95	60-90	45-65	25-40
	33-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
Sk Skidmore	0-9	Silt loam	ML, CL-ML, CL	A-4	0	75-90	75-90	70-85	55-75	20-35	2-10
	9-60	Gravelly loam, extremely gravelly loam, very gravelly loam.	GM, GP-GM	A-2, A-1	5-30	35-60	20-85	15-40	10-35	<30	NP-5
St Stendal	0-6	Silt loam	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	75-90	25-40	5-15
	6-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
TcB*:											
Tilsit	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	60-100	20-35	4-15
	8-24	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	75-100	65-100	25-40	5-20
	24-47	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	85-100	75-100	65-100	25-45	5-25
	47-60	Silt loam, silty clay loam, silty clay.	CL, CH, CL-ML	A-4, A-6, A-7	0-30	70-100	65-85	60-85	55-80	25-60	5-35
Coolville	0-8	Silt loam	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	80-100	70-95	24-40	4-12
	8-18	Silty clay loam	CL, ML	A-7, A-6	0	95-100	85-100	80-100	75-95	35-50	15-25
	18-35	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7, A-6	0-5	95-100	85-100	80-100	75-95	35-65	14-36
	35-45	Clay, silty clay, shaly silty clay loam.	CH, MH, CL	A-7	0-5	95-100	85-100	80-100	75-95	45-65	20-36
	45-50	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
To---------------- Tioga	0-13	Loam---------------	ML, SM	A-4	0	100	95-100	65-95	40-85	<15	NP-4
	13-24	Silt loam, gravelly loam, fine sandy loam.	SM, GM, ML	A-1, A-2, A-4	0	55-100	50-100	35-90	20-80	<15	NP-2
	24-77	Very gravelly silt loam, fine sandy loam, loamy fine sand.	GW-GM, GM, SM, ML	A-1, A-2, A-4, A-3	0-10	35-100	30-100	15-90	5-80	<15	NP-2
WeA--------------- Weinbach	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	20-40	5-15
	10-29	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	70-90	25-35	8-15
	29-51	Silt loam, silty clay loam, clay loam.	CL	A-4, A-6, A-7	0	100	100	90-100	70-90	25-42	8-20
	51-70	Stratified silty clay loam to fine sand.	CL, ML, SM, SC	A-6, A-7, A-2, A-4	0	100	100	90-100	20-95	25-45	NP-20
WfD--------------- Wharton	0-7	Silt loam--------	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90	---	---
	7-46	Channery silt loam, silty clay loam, shaly silt loam.	ML, CL	A-7, A-6	0-25	75-100	70-100	65-95	60-90	35-45	10-25
	46-60	Silt loam, shaly clay, very shaly silt loam.	ML, GM, SM	A-4, A-6, A-7, A-2	0-50	45-100	30-100	25-95	25-90	30-45	5-15
WkD*:											
Wharton----------	0-5	Silt loam--------	ML, CL	A-4, A-6	0-5	95-100	90-100	80-95	70-90	---	---
	5-46	Clay loam, shaly silty clay loam, shaly silt loam.	ML, CL	A-7, A-6	0-25	75-100	70-100	65-95	60-90	35-45	10-25
	46-60	Silt loam, shaly clay, very shaly silt loam.	ML, GM, SM	A-4, A-6, A-7, A-2	0-50	45-100	30-100	25-95	25-90	30-45	5-15
Urban land.											
WmB--------------- Wheeling	0-9	Silt loam--------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	9-53	Silt loam, loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	53-60	Stratified very fine sand to very gravelly sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10
WpB*:											
Wheeling---------	0-9	Silt loam--------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	9-56	Silt loam, loam, fine sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	56-79	Stratified very fine sand to very gravelly sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10
Urban land.											
WyB, WyC2--------- Wyatt	0-6	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	6-55	Silty clay, clay, silty clay loam.	CL, CH, MH	A-7	0	100	100	95-100	85-95	45-70	26-42
	55-60	Clay, silty clay	CL, CH, MH, ML	A-7	0	100	100	90-100	85-95	45-70	20-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AfD: Alford	0-10	12-26	1.25-1.40	0.6-2.0	0.22-0.24	3.6-7.3	Low	0.37	5	5	.5-2
	10-70	22-30	1.35-1.50	0.6-2.0	0.18-0.20	3.6-6.5	Moderate	0.37			
BeC: Berks	0-8	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low	0.17	3	---	.5-3
	8-22	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low	0.17			
	22-28	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low	0.17			
	28-35	---	---	---	---	---	---	----			
BhD: Bethesda	0-6	27-35	1.45-1.65	0.2-0.6	0.08-0.15	3.6-6.0	Low	0.32	5	6	<.5
	6-60	14-35	1.60-1.90	0.2-0.6	0.04-0.10	3.6-6.0	Low	0.32			
BrF*:											
Brownsville	0-3	8-18	1.20-1.45	0.6-6.0	0.09-0.17	3.6-6.5	Low	0.20	5	8	1-3
	3-43	8-18	1.30-1.60	0.6-6.0	0.07-0.14	3.6-5.5	Low	0.17			
	43-60	8-18	1.30-1.60	2.0-6.0	0.03-0.12	3.6-6.0	Low	0.17			
Rock outcrop.											
CaF: Casco	0-4	10-20	1.35-1.55	0.6-2.0	0.19-0.24	5.6-7.3	Low	0.32	3	5	1-3
	4-20	18-35	1.55-1.65	0.6-2.0	0.09-0.19	5.6-7.8	Moderate	0.32			
	20-60	0-2	1.30-1.80	>20	0.02-0.04	7.4-8.4	Low	0.10			
CoB: Coolville	0-8	17-27	1.30-1.50	0.6-2.0	0.18-0.22	3.6-6.5	Low	0.43	4	6	1-3
	8-18	30-40	1.40-1.65	0.6-2.0	0.16-0.19	3.6-5.5	Moderate	0.43			
	18-35	35-60	1.50-1.70	<0.2	0.10-0.15	3.6-5.5	Moderate	0.32			
	35-45	35-60	1.50-1.70	<0.2	0.10-0.15	3.6-5.5	Moderate	0.32			
	45-50	---	---	---	---	---	---	----			
CpC*:											
Coolville	0-8	17-27	1.30-1.50	0.6-2.0	0.18-0.22	3.6-6.5	Low	0.43	4	6	1-3
	8-14	30-40	1.40-1.65	0.6-2.0	0.16-0.19	3.6-5.5	Moderate	0.43			
	14-29	35-60	1.50-1.70	<0.2	0.10-0.15	3.6-5.5	Moderate	0.32			
	29-43	35-60	1.50-1.70	<0.2	0.10-0.15	3.6-5.5	Moderate	0.32			
	43-45	---	---	---	---	---	---	----			
Rarden	0-8	17-27	1.30-1.50	0.6-2.0	0.15-0.19	3.6-6.5	Low	0.43	3	6	1-3
	8-32	35-60	1.50-1.70	0.06-0.2	0.10-0.14	3.6-5.5	High	0.32			
	32-35	---	---	---	---	---	---	----			
Cu: Cuba	0-11	18-25	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	5	5	1-3
	11-60	14-20	1.45-1.65	0.6-2.0	0.19-0.21	4.5-5.5	Low	0.37			
DoA: Doles	0-8	15-25	1.30-1.45	0.6-2.0	0.18-0.22	4.5-7.3	Low	0.43	4	5	1-3
	8-20	20-35	1.40-1.60	0.2-0.6	0.16-0.20	4.5-5.5	Moderate	0.43			
	20-53	20-30	1.60-1.80	0.06-0.2	0.06-0.08	4.5-6.0	Moderate	0.43			
	53-62	20-35	1.40-1.60	0.2-0.6	0.15-0.18	4.5-6.0	Moderate	0.43			
Dp*. Dumps											
EkB: Elkinsville	0-10	7-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	5	5	.5-2
	10-60	19-30	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Moderate	0.37			
	60-70	14-30	1.40-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low	0.37			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
EkE--------------- Elkinsville	0-5	7-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	.5-2
	5-50	19-30	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37			
	50-64	14-30	1.40-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low-----------	0.37			
EmB*:											
Elkinsville-----	0-10	7-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	.5-2
	10-60	19-30	1.40-1.60	0.6-2.0	0.18-0.22	4.5-6.0	Moderate-----	0.37			
	60-70	14-30	1.40-1.60	0.6-2.0	0.11-0.20	4.5-6.0	Low-----------	0.37			
Urban land.											
ErD--------------- Ernest	0-5	15-20	1.20-1.40	0.6-2.0	0.14-0.20	4.5-6.0	Low-----------	0.43	3	---	2-4
	5-24	20-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Moderate-----	0.32			
	24-60	18-30	1.40-1.70	0.06-0.6	0.08-0.12	4.5-5.5	Low-----------	0.32			
FcA--------------- Fitchville	0-10	16-27	1.30-1.45	0.6-2.0	0.17-0.21	4.5-7.3	Low-----------	0.37	5	6	2-3
	10-55	20-35	1.45-1.70	0.2-0.6	0.15-0.19	4.5-7.3	Moderate-----	0.37			
	55-80	16-30	1.40-1.65	0.2-2.0	0.14-0.18	5.6-7.8	Low-----------	0.37			
Ge---------------- Genesee	0-8	18-27	1.30-1.50	0.6-2.0	0.20-0.24	6.1-7.8	Low-----------	0.37	5	5	1-3
	8-60	18-27	1.30-1.50	0.6-2.0	0.17-0.22	6.1-8.4	Low-----------	0.37			
	60-82	10-20	1.30-1.50	0.6-2.0	0.19-0.21	7.4-8.4	Low-----------	0.37			
Ha---------------- Haymond	0-9	10-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
	9-57	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.37			
	57-78	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.37			
Hu---------------- Huntington	0-12	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low-----------	0.28	5	---	3-6
	12-58	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low-----------	0.32			
	58-60	15-30	1.30-1.50	0.6-2.0	0.10-0.16	5.6-7.8	Low-----------	0.28			
La---------------- Landes	0-11	7-20	1.40-1.60	2.0-6.0	0.13-0.20	6.1-8.4	Low-----------	0.20	5	3	1-2
	11-60	5-18	1.60-1.80	6.0-20	0.05-0.15	6.1-8.4	Low-----------	0.20			
LbC, LbD---------- Latham	0-5	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-6.5	Low-----------	0.43	3	6	1-3
	5-38	35-55	1.40-1.70	0.06-0.2	0.11-0.15	3.6-5.5	High----------	0.32			
	38-40	---	---	---	---	---	--------------	----			
LcE*:											
Latham----------	0-3	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-6.5	Low-----------	0.43	3	6	1-3
	3-36	35-55	1.40-1.70	0.06-0.2	0.11-0.15	3.6-5.5	High----------	0.32			
	36-40	---	---	---	---	---	--------------	----			
Brownsville-----	0-6	8-18	1.20-1.45	0.6-6.0	0.09-0.17	3.6-6.5	Low-----------	0.20	5	8	1-3
	6-41	8-18	1.30-1.60	0.6-6.0	0.07-0.14	3.6-5.5	Low-----------	0.17			
	41-60	8-18	1.30-1.60	2.0-6.0	0.03-0.12	3.6-6.0	Low-----------	0.17			
Shelocta--------	0-3	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low-----------	0.32	4	---	.5-5
	3-55	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low-----------	0.28			
	55-60	15-34	1.30-1.55	0.6-6.0	0.08-0.16	4.5-5.5	Low-----------	0.17			
	60-62	---	---	---	---	---	--------------	----			
LgD*:											
Latham----------	0-3	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-6.5	Low-----------	0.43	3	6	1-3
	3-33	35-55	1.40-1.70	0.06-0.2	0.11-0.15	3.6-5.5	High----------	0.32			
	33-40	---	---	---	---	---	--------------	----			
Gilpin----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	---	.5-4
	5-24	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24			
	24-28	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24			
	28-30	---	---	---	---	---	--------------	----			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
LsD*:											
Latham----------	0-5	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-6.5	Low----------	0.43	3	6	1-3
	5-38	35-55	1.40-1.70	0.06-0.2	0.11-0.15	3.6-5.5	High---------	0.32			
	38-40	---	---	---	---	---	-------------	-----			
Steinsburg------	0-8	10-20	1.20-1.40	2.0-6.0	0.10-0.14	4.5-5.5	Low----------	0.28	2	---	1-3
	8-16	10-20	1.20-1.40	2.0-6.0	0.10-0.14	4.5-5.5	Low----------	0.20			
	16-33	5-18	1.10-1.40	2.0-6.0	0.04-0.08	4.5-5.5	Low----------	0.20			
	33-43	---	---	---	---	---	-------------	-----			
MoB, MoC2-------- Monongahela	0-6	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-6.0	Low----------	0.43	3	---	2-4
	6-18	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-6.0	Low----------	0.43			
	18-57	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.43			
	57-70	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.37			
No--------------- Nolin	0-11	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	---	2-4
	11-66	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43			
OcB-------------- Ockley	0-15	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-6.5	Low----------	0.37	5	5	.5-3
	15-27	20-35	1.45-1.60	0.6-2.0	0.15-0.22	4.5-6.0	Moderate-----	0.37			
	27-51	20-35	1.40-1.55	0.6-2.0	0.06-0.11	5.6-7.3	Moderate-----	0.24			
	51-74	2-5	1.60-1.80	>20	0.02-0.04	7.4-8.4	Low----------	0.10			
OmB, OmC--------- Omulga	0-10	12-18	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	5	.5-2
	10-30	20-35	1.30-1.45	0.6-2.0	0.18-0.22	3.6-5.5	Moderate-----	0.43			
	30-43	18-30	1.60-1.80	0.06-0.2	0.06-0.08	3.6-5.5	Moderate-----	0.43			
	43-50	20-35	1.50-1.60	0.2-0.6	0.18-0.21	4.5-6.0	Moderate-----	0.43			
	50-85	22-45	1.50-1.60	0.2-0.6	0.10-0.18	4.5-7.3	Moderate-----	0.28			
OpB*, OpC*:											
Omulga----------	0-10	12-18	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	5	.5-2
	10-30	20-35	1.30-1.45	0.6-2.0	0.18-0.22	3.6-5.5	Moderate-----	0.43			
	30-43	18-30	1.60-1.80	0.06-0.2	0.06-0.08	3.6-5.5	Moderate-----	0.43			
	43-50	20-35	1.50-1.60	0.2-0.6	0.18-0.21	4.5-6.0	Moderate-----	0.43			
	50-85	22-45	1.50-1.60	0.2-0.6	0.10-0.18	4.5-7.3	Moderate-----	0.28			
Urban land.											
Pe--------------- Peoga	0-15	15-26	1.30-1.45	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.43	4	5	1-3
	15-49	22-34	1.40-1.60	0.06-0.2	0.18-0.20	4.5-5.5	Moderate-----	0.43			
	49-82	20-34	1.40-1.60	0.06-0.2	0.19-0.21	4.5-6.5	Low----------	0.43			
Po--------------- Piopolis	0-5	20-27	1.20-1.40	0.2-0.6	0.22-0.24	5.1-6.5	Low----------	0.43	4	6	1-3
	5-60	27-35	1.40-1.60	0.06-0.2	0.18-0.20	4.5-6.0	Moderate-----	0.43			
Ps*, Pt*. Pits											
RbC-------------- Rarden	0-6	17-27	1.30-1.50	0.6-2.0	0.15-0.19	3.6-6.5	Low----------	0.43	3	6	1-3
	6-32	35-60	1.50-1.70	0.06-0.2	0.10-0.14	3.6-5.5	High---------	0.32			
	32-35	---	---	---	---	---	-------------	-----			
Ro--------------- Rossburg	0-15	27-32	1.20-1.50	0.6-2.0	0.20-0.23	6.1-7.8	Moderate-----	0.37	5	7	4-8
	15-44	18-27	1.25-1.60	0.6-2.0	0.15-0.22	6.1-7.8	Low----------	0.37			
	44-80	5-15	1.30-1.60	2.0-20	0.05-0.15	6.6-8.4	Low----------	0.24			
SaB-------------- Sardinia	0-10	20-27	1.30-1.50	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	6	1-3
	10-75	24-35	1.35-1.60	0.2-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.37			
	75-80	20-35	1.35-1.60	0.6-2.0	0.15-0.18	5.6-7.3	Moderate-----	0.37			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
SacB------------- Sciotoville	0-13	15-27	1.30-1.45	0.6-2.0	0.18-0.22	5.1-6.5	Low----------	0.37	4	6	1-3
	13-34	20-32	1.40-1.60	0.6-2.0	0.17-0.21	4.5-5.5	Low----------	0.37			
	34-59	20-32	1.60-1.80	0.06-0.6	0.10-0.14	4.5-6.0	Low----------	0.37			
	59-69	15-35	1.50-1.65	2.0-6.0	0.10-0.14	5.1-6.5	Low----------	0.37			
SbB, SbC, SbD---- Shelocta	0-9	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	---	.5-5
	9-60	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28			
ScE*, ScF*:											
Shelocta--------	0-9	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	---	.5-5
	9-60	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28			
Brownsville-----	0-3	8-18	1.20-1.45	0.6-6.0	0.18-0.23	3.6-6.0	Low----------	0.28	5	5	1-3
	3-43	8-18	1.30-1.60	0.6-6.0	0.07-0.14	3.6-5.5	Low----------	0.17			
	43-60	8-18	1.30-1.60	2.0-6.0	0.03-0.12	3.6-6.0	Low----------	0.17			
SeF*:											
Shelocta--------	0-9	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	---	.5-5
	9-60	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28			
Steinsburg------	0-5	10-20	1.20-1.40	2.0-6.0	0.10-0.14	4.5-5.5	Low----------	0.28	2	---	1-3
	5-28	10-20	1.20-1.40	2.0-6.0	0.10-0.14	4.5-5.5	Low----------	0.20			
	28-30	---	---	---	---	---	-------------	----			
SfE*:											
Shelocta--------	0-6	10-25	1.15-1.30	0.6-2.0	0.16-0.22	4.5-5.5	Low----------	0.32	4	---	.5-5
	6-68	18-34	1.30-1.55	0.6-2.0	0.10-0.20	4.5-5.5	Low----------	0.28			
Wharton---------	0-5	15-25	1.10-1.30	0.6-2.0	0.16-0.20	4.0-6.0	Low----------	0.37	3	---	1-4
	5-60	15-35	1.20-1.50	0.06-0.6	0.12-0.16	4.0-6.0	Moderate-----	0.24			
Latham----------	0-9	20-27	1.30-1.50	0.6-2.0	0.16-0.20	3.6-6.5	Low----------	0.43	3	6	1-3
	9-33	35-55	1.40-1.70	0.06-0.2	0.11-0.15	3.6-5.5	High---------	0.32			
	33-38	---	---	---	---	---	-------------	----			
Sk--------------- Skidmore	0-9	17-27	1.20-1.40	2.0-6.0	0.13-0.18	5.6-7.8	Low----------	0.32	3	6	1-3
	9-60	7-18	1.30-1.60	2.0-6.0	0.04-0.10	5.6-7.8	Low----------	0.17			
St--------------- Stendal	0-6	18-27	1.30-1.45	0.6-2.0	0.22-0.24	4.5-6.5	Low----------	0.37	5	5	1-3
	6-60	18-35	1.45-1.65	0.6-2.0	0.20-0.22	4.5-6.0	Low----------	0.37			
TcB*:											
Tilsit----------	0-8	10-25	1.20-1.55	0.6-2.0	0.16-0.22	3.6-6.0	Low----------	0.43	3	---	1-3
	8-24	18-35	1.30-1.55	0.6-2.0	0.16-0.22	3.6-6.0	Low----------	0.43			
	24-47	18-35	1.40-1.65	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.43			
	47-60	10-40	1.40-1.60	0.06-0.6	0.08-0.12	3.6-5.5	Low----------	0.43			
Coolville-------	0-8	17-27	1.30-1.50	0.6-2.0	0.18-0.22	3.6-6.5	Low----------	0.43	4	6	1-3
	8-18	30-40	1.40-1.65	0.6-2.0	0.16-0.19	3.6-5.5	Moderate-----	0.43			
	18-35	35-60	1.50-1.70	<0.2	0.10-0.15	3.6-5.5	Moderate-----	0.32			
	35-45	35-60	1.50-1.70	<0.2	0.10-0.15	3.6-5.5	Moderate-----	0.32			
	45-50	---	---	---	---	---	-------------	----			
To--------------- Tioga	0-13	5-18	1.15-1.40	0.6-6.0	0.15-0.21	5.1-7.3	Low----------	0.37	5	---	2-6
	13-24	5-18	1.15-1.45	0.6-6.0	0.07-0.20	5.1-7.3	Low----------	0.28			
	24-77	3-15	1.25-1.55	0.6-20	0.02-0.20	5.6-7.8	Low----------	0.28			
WeA-------------- Weinbach	0-10	18-27	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.43	4	5	1-3
	10-29	20-30	1.40-1.60	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43			
	29-51	20-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low----------	0.43			
	51-70	15-35	1.50-1.65	0.2-0.6	0.19-0.21	4.5-6.0	Low----------	0.43			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
WfD--------------	0-7	15-25	1.10-1.30	0.6-2.0	0.16-0.20	4.0-6.0	Low----------	0.37	3	---	1-4
Wharton	7-46	15-35	1.20-1.50	0.06-0.6	0.12-0.16	4.0-6.0	Moderate-----	0.24			
	46-60	20-45	1.20-1.60	0.06-0.6	0.08-0.12	4.0-5.5	Moderate-----	0.17			
WkD*:											
Wharton---------	0-5	15-25	1.10-1.30	0.6-2.0	0.16-0.20	4.0-6.0	Low----------	0.37	3	---	1-4
	5-46	15-35	1.20-1.50	0.06-0.6	0.12-0.16	4.0-6.0	Moderate-----	0.24			
	46-60	20-45	1.20-1.60	0.06-0.6	0.08-0.12	4.0-5.5	Moderate-----	0.17			
Urban land.											
WmB--------------	0-9	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.5	Low----------	0.37	4	---	1-3
Wheeling	9-53	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32			
	53-60	8-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	Low----------	0.20			
WpB*:											
Wheeling--------	0-9	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.5	Low----------	0.37	4	---	1-3
	9-56	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low----------	0.32			
	56-79	8-15	1.30-1.50	6.0-20	0.04-0.08	5.1-6.0	Low----------	0.20			
Urban land.											
WyB, WyC2--------	0-6	20-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	6	1-3
Wyatt	6-55	45-60	1.35-1.70	<0.2	0.09-0.13	4.5-7.3	High---------	0.32			
	55-60	60-85	1.45-1.75	<0.2	0.04-0.06	5.6-7.8	High---------	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
AfD: Alford	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	High.
BeC: Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
BhD: Bethesda	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
BrF*:												
Brownsville	C	None	---	---	>6.0	---	---	40-72	Soft	Moderate	Low	High.
Rock outcrop.												
CaF: Casco	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
CoB: Coolville	C	None	---	---	2.0-3.5	Perched	Feb-Apr	40-60	Soft	High	High	High.
CpC*:												
Coolville	C	None	---	---	2.0-3.5	Perched	Feb-Apr	40-60	Soft	High	High	High.
Rarden	C	None	---	---	2.0-3.0	Perched	Jan-Apr	20-40	Soft	High	High	High.
Cu: Cuba	B	Occasional	Brief	Jan-May	>6.0	---	---	>60	---	High	Low	High.
DoA: Doles	C	None	---	---	1.0-2.0	Perched	Nov-May	>60	---	High	High	High.
Dp*. Dumps												

See footnotes at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
EkB, EkE---------- Elkinsville	B	None**------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
EmB*:												
Elkinsville------	B	None**------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
Urban land.												
ErD--------------- Ernest	C	None--------	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	Moderate	Moderate.
FcA--------------- Fitchville	C	None**------	---	---	1.0-2.5	Perched	Nov-May	>60	---	High-----	High-----	Moderate.
Ge---------------- Genesee	B	Occasional	Brief-----	Oct-Jun	>6.0	---	---	>60	---	Moderate	Low------	Low.
Ha---------------- Haymond	B	Occasional	Brief-----	Jan-May	>6.0	---	---	>60	---	High-----	Low------	Low.
Hu---------------- Huntington	B	Occasional	Brief-----	Dec-May	>6.0	---	---	>60	---	High-----	Low------	Moderate.
La---------------- Landes	B	Occasional	Brief-----	Jan-Jun	>6.0	---	---	>60	---	Moderate	Low------	Low.
LbC, LbD---------- Latham	D	None--------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High-----	High.
LcE*:												
Latham-----------	D	None--------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High-----	High.
Brownsville------	C	None--------	---	---	>6.0	---	---	40-72	Soft	Moderate	Low------	High.
Shelocta---------	B	None--------	---	---	>6.0	---	---	>48	Hard	Moderate	Low------	High.
LgD*:												
Latham-----------	D	None--------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High-----	High-----	High.

See footnotes at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
LgD*:												
Gilpin	C	None	---	---	>6.0	---	---	24-40	Soft	Moderate	Low	High.
LsD*:												
Latham	D	None	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High	High	High.
Steinsburg	C	None	---	---	>6.0	---	---	24-40	Soft	Moderate	Low	High.
MoB, MoC2 Monongahela	C	None	---	---	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High	High.
No Nolin	B	Occasional	Brief to long.	Feb-May	>6.0	---	---	>60	---	High	Low	Moderate.
OcB Ockley	B	None**	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
OmB, OmC Omulga	C	None	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	High	Moderate	High.
OpB*, OpC*:												
Omulga	C	None	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	High	Moderate	High.
Urban land.												
Pe Peoga	C	Rare	---	---	0-1.0	Apparent	Jan-May	>60	---	High	High	High.
Po Piopolis	C/D	Frequent	Long	Mar-Jun	+.5-3.0	Apparent	Mar-Jun	>60	---	High	High	Moderate.
Ps*, Pt*. Pits												
RbC Rarden	C	None	---	---	2.0-3.0	Perched	Jan-Apr	20-40	Soft	High	High	High.
Ro Rossburg	B	Occasional	Very brief	Nov-Jun	>6.0	---	---	>60	---	Moderate	Low	Low.

See footnotes at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
SaB----------------- Sardinia	C	None**-------	---	---	1.5-3.0	Perched	Jan-Apr	>60	---	High------	High------	Moderate.
SacB--------------- Sciotoville	C	None**-------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High------	Moderate	High.
SbB, SbC, SbD------ Shelocta	B	None---------	---	---	>6.0	---	---	>48	Hard	Moderate	Low-------	High.
ScE*, ScF*:												
Shelocta----------	B	None---------	---	---	>6.0	---	---	>48	Hard	Moderate	Low-------	High.
Brownsville-------	C	None---------	---	---	>6.0	---	---	40-72	Soft	Moderate	Low-------	High.
SeF*:												
Shelocta----------	B	None---------	---	---	>6.0	---	---	>48	Hard	Moderate	Low-------	High.
Steinsburg--------	C	None---------	---	---	>6.0	---	---	24-40	Soft	Moderate	Low-------	High.
SfE*:												
Shelocta----------	B	None---------	---	---	>6.0	---	---	>48	Hard	Moderate	Low-------	High.
Wharton-----------	C	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>40	Soft	High------	High------	High.
Latham------------	D	None---------	---	---	1.5-3.0	Perched	Jan-Apr	20-40	Soft	High------	High------	High.
Sk----------------- Skidmore	B	Occasional	Very brief	Dec-May	3.0-4.0	Apparent	Dec-Mar	>40	Hard	Moderate	Low-------	Moderate.
St----------------- Stendal	C	Occasional	Brief------	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High------	High------	High.
TcB*:												
Tilsit------------	C	None---------	---	---	1.5-2.5	Perched	Jan-Apr	>40	Hard	High------	High------	High.
Coolville---------	C	None---------	---	---	2.0-3.5	Perched	Feb-Apr	40-60	Soft	High------	High------	High.
To----------------- Tioga	B	Occasional	Brief------	Nov-May	3.0-6.0	Apparent	Feb-Apr	>60	---	Moderate	Low-------	Moderate.

See footnotes at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
WeA--------------- Weinbach	C	None**-------	---	---	1.0-3.0	Perched	Jan-Apr	>60	---	High-----	High-----	High.
WfD--------------- Wharton	C	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>40	Soft	High-----	High-----	High.
WkD*:												
Wharton----------	C	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>40	Soft	High-----	High-----	High.
Urban land.												
WmB--------------- Wheeling	B	None**-------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
WpB*:												
Wheeling---------	B	None**-------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
Urban land.												
WyB, WyC2--------- Wyatt	C	None---------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.
** Included in mapping are small areas that are subject to rare flooding.

TABLE 19.--FLOOD ELEVATIONS AT SELECTED LOCATIONS

Flood	Elevation*			
	Greenup locks and dam RM 341	C&O Northern Railroad bridge RM 348.9	Portsmouth gaging station RM 356	Buena Vista, Ohio RM 374
Intermediate regional flood	540.2	537.5	535.1	528.2
1937 flood	548.8	546.4	544.4	538.3

* Feet above mean sea level.

TABLE 20.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. RN means report number; HO, horizon; MAX, maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; AA, AASHTO; and UN, Unified)

Soil name and location	Parent material	RN	Depth	HO	Moisture density: MAX	Moisture density: OPT	Mechanical analysis, Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.02 mm	0.005 mm	0.002 mm	LL	PI	Classification: AA	UN
			In		Lb/ft^3	Pct								Pct			
Coolville silt loam: Rush Township, about 1,400 feet southeast of the intersection of State Route 348 and Owensville Road along Owensville Road, then 1,000 feet east.	Loess and underlying residuum.	SC-12															
		24243	0-8	Ap	102	19	100	95	94	91	---	36	---	33	8	A-4	ML
		24244	23-27	2Bt3	105	19	100	100	99	98	---	54	---	37	14	A-6	CL
Omulga silt loam: Madison Township, about 1,930 feet west and 890 feet south of the northeast corner of sec. 17, T. 4 N., R. 20 W.	Loess, colluvium or old alluvium, and the underlying lacustrine sediments.	SC-8															
		24234	24-30	Bt4	109	18	100	100	98	91	---	45	---	32	9	A-4	CL
		24235	62-71	2Bt3	100	23	100	100	99	94	---	76	---	50	22	A-7-6	CL
Wyatt silt loam: Madison Township, about 1,325 feet east and 700 feet south of the northwest corner of sec. 17, T. 4 N., R. 20 W.	Lacustrine sediments.	SC-11															
		24240	0-6	Ap	101	19	100	100	96	90	---	35	---	33	9	A-4	ML
		24241	6-19	Bt1, Bt2, Bt3	100	22	100	100	98	96	---	76	---	60	31	A-7-6	CH

TABLE 21.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alford	Fine-silty, mixed, mesic Typic Hapludalfs
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Bethesda	Loamy-skeletal, mixed, acid, mesic Typic Udorthents
Brownsville	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Casco	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Coolville	Fine, mixed, mesic Aquultic Hapludalfs
Cuba	Fine-silty, mixed, mesic Fluventic Dystrochrepts
Doles	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Elkinsville	Fine-silty, mixed, mesic Ultic Hapludalfs
Ernest	Fine-loamy, mixed, mesic Aquic Fragiudults
Fitchville	Fine-silty, mixed, mesic Aeric Ochraqualfs
Genesee	Fine-loamy, mixed, nonacid, mesic Typic Udifluvents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Haymond	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Landes	Coarse-loamy, mixed, mesic Fluventic Hapludolls
Latham	Clayey, mixed, mesic Aquic Hapludults
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Ockley	Fine-loamy, mixed, mesic Typic Hapludalfs
Omulga	Fine-silty, mixed, mesic Typic Fragiudalfs
Peoga	Fine-silty, mixed, mesic Typic Ochraqualfs
Piopolis	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Rarden	Fine, mixed, mesic Aquultic Hapludalfs
Rossburg	Fine-loamy, mixed, mesic Fluventic Hapludolls
Sardinia	Fine-silty, mixed, mesic Aquic Hapludalfs
Sciotoville	Fine-silty, mixed, mesic Aquic Fragiudalfs
Shelocta	Fine-loamy, mixed, mesic Typic Hapludults
Skidmore	Loamy-skeletal, mixed, mesic Dystric Fluventic Eutrochrepts
Steinsburg	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Stendal	Fine-silty, mixed, acid, mesic Aeric Fluvaquents
Tilsit	Fine-silty, mixed, mesic Typic Fragiudults
Tioga	Coarse-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Weinbach	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Wharton	Fine-loamy, mixed, mesic Aquic Hapludults
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Wyatt	Fine, illitic, mesic Aquic Hapludalfs

Interpretive Groups

INTERPRETIVE GROUPS

(Dashes indicate that the soil was not assigned to the interpretive group)

Soil name and map symbol	Land capability	Prime farmland	Woodland ordination symbol
AfD Alford	IVe	No	5R
BeC Berks	IIIe	No	4F
BhD Bethesda	VIs	No	---
BrF	VIIe	No	
Brownsville (north aspect)			4R
Brownsville (south aspect)			3R
Rock outcrop			---
CaF Casco	VIIe	No	4R
CoB Coolville	IIe	Yes	4A
CpC	IIIe	No	
Coolville			4A
Rarden			4C
Cu Cuba	IIw	Yes	5A
DoA Doles	IIw	Yes*	4A
Dp Dumps	---	No	---
EkB Elkinsville	IIe	Yes	5A
EkE Elkinsville	VIe	No	5R
EmB:			
Elkinsville	IIe	No	---
Urban land	---	No	---
ErD Ernest	IVe	No	4R
FcA Fitchville	IIw	Yes*	5A
Ge Genesee	IIw	Yes	5A
Ha Haymond	IIw	Yes	5A
Hu Huntington	IIw	Yes	5A

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Woodland ordination symbol
La Landes	IIw	Yes	5A
LbC Latham	IVe	No	3C
LbD	VIe	No	
Latham (north aspect)			4R
Latham (south aspect)			3R
LcE	VIe	No	
Latham (north aspect)			4R
Latham (south aspect)			3R
Brownsville (north aspect)			4R
Brownsville (south aspect)			3R
Shelocta (north aspect)			4R
Shelocta (south aspect)			4R
LgD	IVe	No	
Latham			3C
Gilpin			4R
LsD	VIe	No	
Latham (north aspect)			4R
Latham (south aspect)			3R
Steinsburg (north aspect)			4R
Steinsburg (south aspect)			3R
MoB Monongahela	IIe	Yes	4A
MoC2 Monongahela	IIIe	No	4A
No Nolin	IIw	Yes	5A
OcB Ockley	IIe	Yes	4A
OmB Omulga	IIe	Yes	4A
OmC Omulga	IIIe	No	4A
OpB:			
Omulga	IIe	No	---
Urban land	---	No	---
OpC:			
Omulga	IIIe	No	---
Urban land	---	No	---
Pe Peoga	IIIw	Yes*	5W
Po Piopolis	Vw	No	---

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Woodland ordination symbol
Ps Pits, gravel	---	No	---
Pt Pits, quarry	---	No	---
RbC Rarden	IIIe	No	4C
Ro Rossburg	IIw	Yes	5A
SaB Sardinia	IIe	Yes	5A
SacB Sciotoville	IIe	Yes	4A
SbB Shelocta	IIe	Yes	4A
SbC Shelocta	IIIe	No	4A
SbD	IVe	No	
Shelocta (north aspect)			4R
Shelocta (south aspect)			4R
ScE	VIe	No	
Shelocta (north aspect)			4R
Shelocta (south aspect)			4R
Brownsville (north aspect)			4R
Brownsville (south aspect)			3R
ScF	VIIe	No	
Shelocta (north aspect)			4R
Shelocta (south aspect)			4R
Brownsville (north aspect)			4R
Brownsville (south aspect)			3R
SeF	VIIe	No	
Shelocta (north aspect)			4R
Shelocta (south aspect)			4R
Steinsburg (north aspect)			4R
Steinsburg (south aspect)			3R
SfE	VIe	No	
Shelocta (north aspect)			4R
Shelocta (south aspect)			4R
Wharton (north aspect)			4R
Wharton (south aspect)			4R
Latham (north aspect)			4R
Latham (south aspect)			3R
Sk Skidmore	IIw	No	4A
St Stendal	IIw	Yes*	5A

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Woodland ordination symbol
TcB	IIe	No	
Tilsit			4A
Coolville			4A
To	IIw	Yes	4A
Tioga			
WeA	IIw	Yes*	4D
Weinbach			
WfD	IVe	No	
Wharton (north aspect)			4R
Wharton (south aspect)			4R
WkD:			
Wharton	IVe	No	---
Urban land	---	No	---
WmB	IIe	Yes	4A
Wheeling			
WpB:			
Wheeling	IIe	No	---
Urban land	---	No	---
WyB	IIIe	Yes	4C
Wyatt			
WyC2	IVe	No	4C
Wyatt			

* Where drained.

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