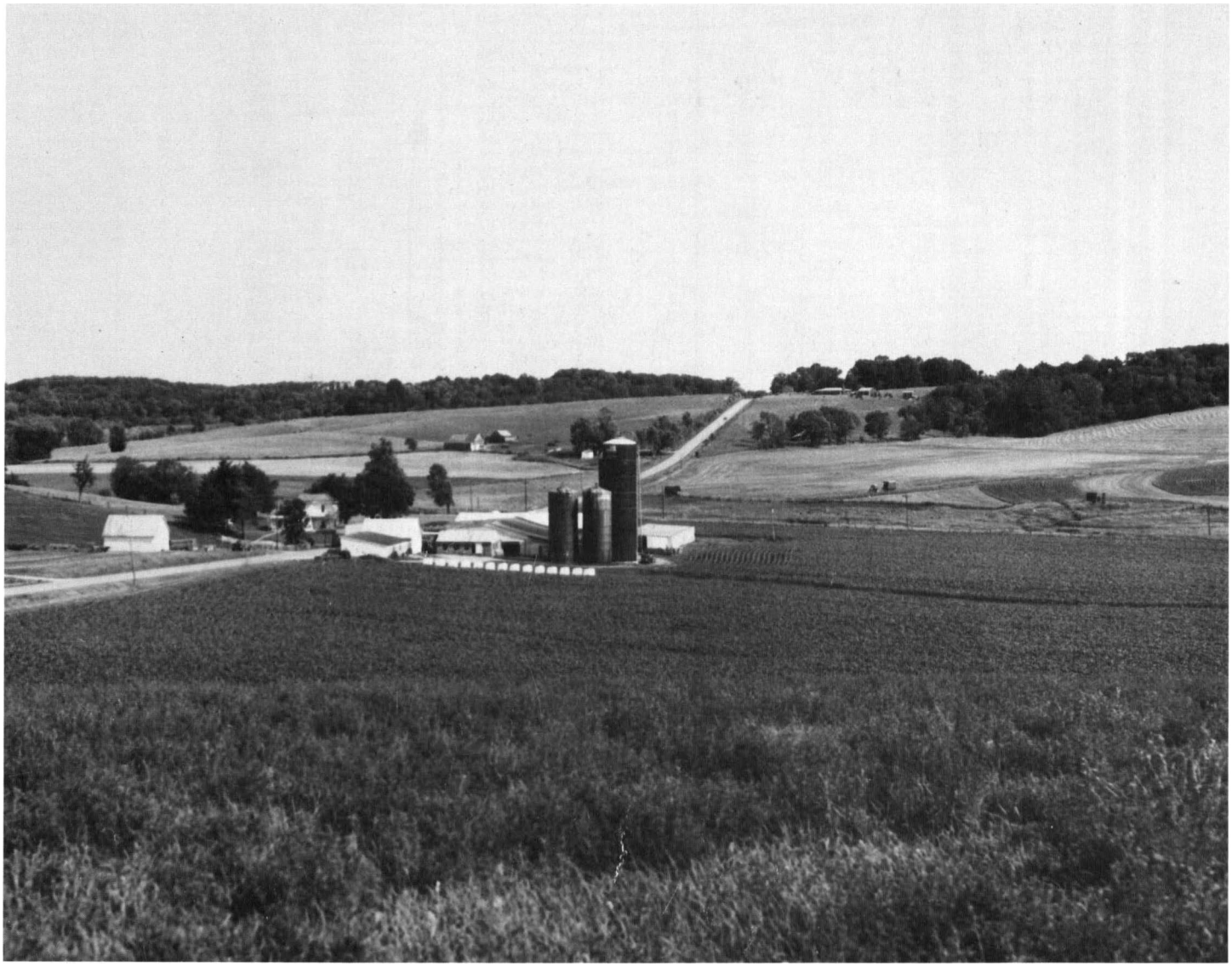
United States Department of Agriculture

Soil Conservation Service

In cooperation with Ohio Department of Natural Resources, Division of Soil and Water Conservation, and Ohio Agricultural Research and Development Center

Soil Survey of Licking County, Ohio



How To Use This Soil Survey

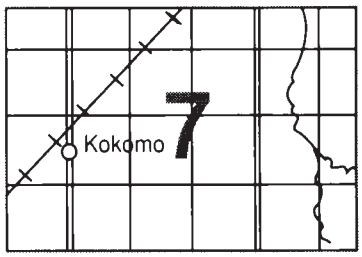
General Soil Map

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

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

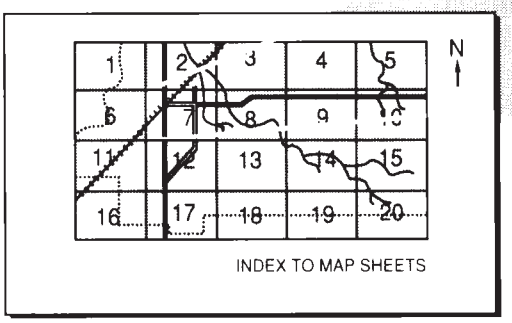
Detailed Soil Maps

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



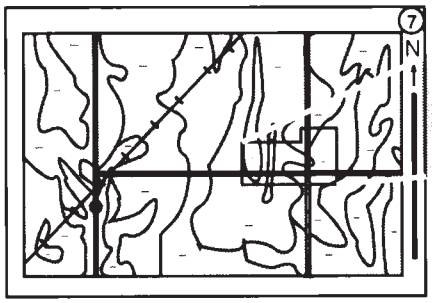
MAP SHEET

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

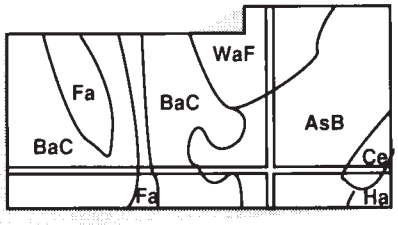


INDEX TO MAP SHEETS

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



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

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

This 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.

Major fieldwork for this soil survey was completed in 1985. Soil names and descriptions were approved in 1986. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1986. This survey was made cooperatively by the Soil Conservation 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 Licking County Soil and Water Conservation District. The survey was materially aided by the Licking County Board of 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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Typical area of the Homewood-Brownsville-Coshocton association in Licking County. Hay and feed grains are grown for livestock in this area.

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Issued May 1992

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Foreword

This soil survey contains information that can be used in land-planning programs in Licking 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 moderately deep to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table 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 Licking County, Ohio

By Robert J. Parkinson, Michael L. Wigginton, and Paul C. Jenny, Soil Conservation Service

Fieldwork by Robert J. Parkinson, Michael L. Wigginton, Paul C. Jenny, Niles A. McLoda, and Mark A. Johnson, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
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LICKING COUNTY is in the central part of Ohio (fig. 1). It has a total area of 438,976 acres, or 685 square miles. Newark, the county seat, is near the center of the county. In 1980, the population of the county was 120,981 and that of the city of Newark was 41,200.

About two-thirds of the land in Licking County is used for farming *(5)*. The rest is used as woodland or is developed for urban, industrial, residential, or other uses. The acreage of agricultural land is increasingly being converted to nonfarm uses, especially in the Newark-Heath area and in the western part of the county. This development is mainly on prime farmland.

This survey updates the soil survey of Licking County published in 1938 *(26)*. It provides additional information and has larger maps, which show the soils in more detail.

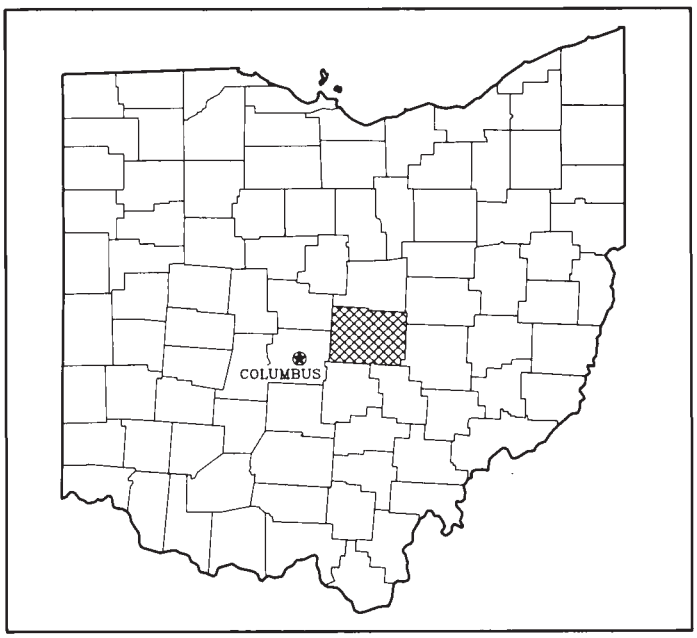

Figure 1.—Location of Licking County in Ohio.

General Nature of the County

This section gives general information about the county. It describes climate; physiography, relief, and drainage; bedrock geology; glacial geology; natural vegetation; agriculture; natural resources; history; and transportation facilities *(25)*.

Climate

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

Licking County typically has cold winters and hot, humid summers. Precipitation in the winter, mainly in the form of snow, and rains early in the spring commonly result in a good accumulation of soil moisture by spring. Severe drought in summer is rare on most soils. The normal annual precipitation is adequate for all of the crops that are suited to the temperature and growing season in the county.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Newark, Ohio, for

the period 1951 to 1981. 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 30 degrees F and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at Newark on February 3, 1951, is -26 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred on July 14, 1954, is 103 degrees.

Growing degree days, shown in table 1, 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 23.5 inches, or nearly 60 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 20 inches. The heaviest 1-day rainfall during the period of record was 4.16 inches at Newark on September 14, 1979. Thunderstorms occur on about 42 days each year.

The average seasonal snowfall is about 26 inches. The greatest snow depth at any one time during the period of record was 19 inches. On the average, 19 days have at least 1 inch of snow on the ground, but 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.

Tornadoes and severe thunderstorms occur occasionally. These storms are generally local in extent and of short duration and cause damage in scattered areas.

Physiography, Relief, and Drainage

Licking County is in two physiographic provinces. The eastern third is part of the Allegheny Plateau Province, and the rest is on the eastern edge of the glaciated section of the Central Lowlands Province *(19)*.

The highest elevation in the county is about 1,360 feet above sea level. It is in an area in Liberty Township. The lowest elevation is about 740 feet above sea level. It is in an area in Hanover Township where the Licking River leaves the county.

In many areas in the far western part of the county and in the southern part west of Buckeye Lake, the soils generally are nearly level and gently sloping. The natural surface drainage pattern is weakly expressed. Runoff commonly ponds in swales or depressions because few of the major streams in these areas have tributaries.

Relief throughout the west-central part of the county is gently undulating and rolling on moraines and moderately steep to very steep along dissected valleys and on bedrock-controlled hills northeast of Granville, in the Welsh Hills area. The eastern part of the county, or the plateau section, has hilly topography with local relief of about 200 feet between ridgetops and flood plains. Hillsides are relatively long, ridgetops are relatively broad to narrow, and flood plains are relatively narrow.

The Licking River is the principal stream in the county. It forms at the confluence of the North Fork of the Licking River, the South Fork of the Licking River, and Raccoon Creek at Newark (fig. 2). The Licking River flows into Dillon Lake, which is in Muskingum County.

Most of Licking County is drained by the Licking River and its tributaries. The northeastern part, however, is drained by Wakatomika Creek, and the southeastern part is drained by tributaries of Jonathan Creek. These streams are in the Muskingum River drainage basin. Part of western Licking County is drained by tributaries of Big Walnut Creek and Little Walnut Creek, which are part of the Scioto River drainage basin. Several tributaries of Big Walnut Creek, such as Duncan Run and the North Fork, East Fork, and South Fork of Rattlesnake Creek, flow into the Hoover Reservoir, which is in Delaware County.

Major changes in the drainage pattern occurred during the periods of glaciation. Preglacial drainage of Licking County was by two large Teays-stage rivers and their tributaries, which generally flowed southwest into the principal Teays River. The preglacial drainage system was obliterated by the ice as the Teays-stage valleys were filled with glacial drift.

As it advanced, the glacial ice generally gouged the surface by grinding rocks and stones and it dammed rivers. Drainage diversions are common in areas in the eastern part of the county where outlets were blocked by either glacial drift or ice. The ponded water established a new drainage course by overflowing a former divide. Licking Gorge is an example of a drainage diversion that formed during the Illinoian Glaciation.

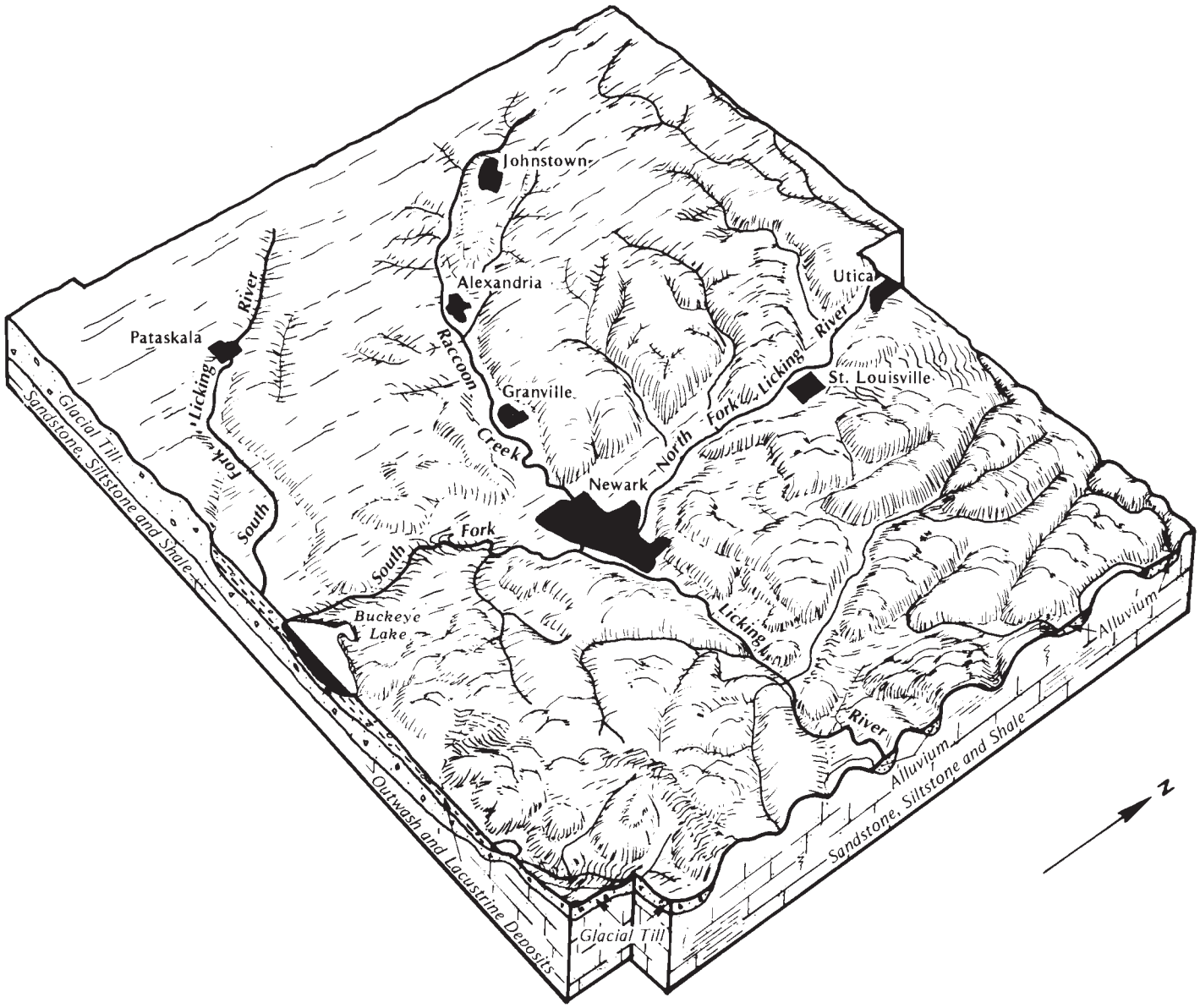

Figure 2.—Drainage, relief, and parent material in Licking County, Ohio.

Bedrock Geology

Licking County is underlain by sedimentary rocks, such as sandstone, siltstone, and shale. These rocks are horizontally bedded and dip slightly to the east. The bedrock in the Central Lowlands Province is of Mississippian age. It is mainly the Cuyahoga Formation. The bedrock on the Allegheny Plateau consists of the Mississippian-age Logan Formation and the Pennsylvanian-age Pottsville and Allegheny Groups, which include the Harrison Formation, Vanport Limestone, and other rocks *(11)*. Two geological features are the Blackhand Gorge, which formed in the Blackhand Sandstone of the Cuyahoga Formation, and the bright colored flint deposits in the Vanport Limestone at Flint Ridge.

The hills on the western edge of the Allegheny Plateau are underlain dominantly by siltstone and fine grained sandstone of the Logan Formation (fig. 3). These bedrock formations dip slightly to the southeast and change from surface to subsurface positions from west to east.

Glacial Geology

Continental glaciers that spread over much of the northern United States advanced through Licking County at least twice during the Pleistocene *(10)*. The earlier glaciation, the Illinoian Glaciation, covered much of the county but did not cover the eastern part. The later glaciation, the Wisconsinan Glaciation, did not advance so far to the east. The Illinoian Glaciation is estimated to have taken place between 132,000 and 302,000 years ago and the Wisconsinan Glaciation about 20,000 years ago *(9, 12)*.

Huge loads of debris consisting of boulders, cobbles, pebbles, sand, silt, and clay were deposited as glacial drift when the glacial ice melted. The mantle of drift in the glaciated part of the county ranges from a few inches to more than 100 feet in thickness. In some areas, drift was not deposited or the deposits have been removed by erosion.

The drift ice was derived from the bedrock over which the glaciers passed. Most of the material was of local origin, although many rocks and other material were carried hundreds of miles by the ice. The drift in this county originated from local sandstone and shale; from the limestone, dolomite, and shale in central and northern Ohio; and from the granite, quartzite, and other crystalline rocks on the Canadian highlands. The proportions of these different rocks varied, but most of the drift had enough limestone, dolomite, and their weathered products to be calcareous. The boulders and other erratics in the county are nearly all granite, quartzite, or other rocks that are resistant to weathering.

In many areas a ground moraine formed when the ice was melting more rapidly than it was advancing. Debris was deposited at the base of the ice as the ice retreated. The drift in the ground moraine is fairly uniform in thickness, and the surface relief coincides generally with the relief of the underlying bedrock. As a result, the ground moraine in the Central Lowlands Province is smooth and is characterized by little topographic expression. Most of the glacial drift on the Allegheny Plateau tends to follow the topography of the underlying bedrock surface.

End moraines formed in areas where the rate at which the ice melted was about equal to its rate of advance. Debris was carried forward to the edge and deposited along the ice front. These moraines are belts of hummocky or rolling topography. Most of them are continuous along the former ice front, but in some areas they are broken or isolated as a result of stream dissection.

Ground moraines and end moraines consist of a compact mass of mixed sand, silt, clay, pebbles, cobbles, and a few boulders. This mass is known as glacial till. Irregular and commonly unpredictable lenses or pockets of sorted sand, silt, clay, or gravel can occur, especially in some areas on end moraines. Unweathered or unoxidized till is gray because of unoxidized minerals. When this till becomes oxidized, its color changes to yellowish brown. As till weathers, the carbonates are leached.

Figure 3.—Thinly bedded siltstone and sandstone of the Logan Formation in an area on the western edge of the Allegheny Plateau. Brownsville soils formed in material weathered from these rocks.

While the glaciers covered this survey area, periods of relatively warm weather caused some debris-filled ice to melt. As the meltwater poured from the glaciers, a

system of streams and rivers formed. Temporary lakes formed where the flow was hindered or outlets were blocked. The meltwater carried large quantities of rock material. The cobblestones, pebbles, and coarser sands were deposited by swift water, the finer sands by the more slowly moving water, and the silts and clays by the quiet waters in temporary lakes or ponded areas. Deposits of material laid down by streams flowing from the glaciers are known as glaciofluvial deposits. Deposits laid down in quiet waters or temporary lakes are known as lacustrine deposits.

Outwash sand and gravel have been deposited in the major valleys through which the meltwater from both the Illinoian and Wisconsinan glaciers flowed. Where the Wisconsinan glacier overran the earlier Illinoian deposits, the Illinoian formations were destroyed or covered. If the two kinds of outwash are in the same valley, the Illinoian deposits are in notably higher positions on the landscape than the Wisconsinan deposits. Three separate levels of Wisconsinan outwash terraces have been identified *(10)*. The outwash gravel consists of limestone, sandstone, and some crystalline pebbles. The Illinoian outwash is typically weathered and leached to a considerably greater depth because it is older.

The main deposit of Wisconsinan outwash in the county is in the large valleys along the Licking River and its main tributaries. The Wisconsinan outwash in the eastern and southern parts of the county has more sandstone and less limestone than that elsewhere.

Illinoian outwash is on the high terraces along the Licking River between Newark and Boston. Another major terrace remnant is in the Newton Chapel area, in Newton Township.

Scattered lacustrine deposits are in many nearly level, basinlike areas throughout the area of Wisconsinan drift. The lacustrine material consists of stratified clay, silt, and fine sand deposited in lakes or ponded water. The largest area of lacustrine deposits of Wisconsinan age is in the Buckeye Lake area.

Other glaciofluvial deposits in the county are on kames and kame terraces. Kames are prominent moundlike knolls or hills made up of sorted sediments that were deposited in crevasses in the ice or on the surface of stagnant ice. The hills in the northwestern corner of Hartford Township are examples of kames.

Kame terraces are ice-contact deposits in areas where stratified glacial drift was deposited by meltwater between a valley side and the glacier. The area of high fill along the north side of Licking Valley in Madison Township is an example of a kame terrace.

Some areas on prominent hills were covered by Wisconsinan or Illinoian ice but do not have a mantle of glacial drift. These areas may have been covered by clean ice, which would have carried little debris, or the drift that was deposited may have been completely eroded. Widely scattered glacial erratics are in some of these areas.

Natural Vegetation

Licking County was dominantly forested at the time of settlement. The western half of the county was beech forest, the northwest corner was mixed mesophytic forest, and the southeast corner was mixed oak forest. Elm-ash swamp forests were in the south-central part of the county and in scattered areas in the western half.

The county also had a few small areas of prairie. Bowling Green Prairie, a series of prairies 4 miles below Newark, extended for 1 mile or more along the Licking River. Cranberry Prairie, or Worthen Prairie, in Washington Township was actually a swamp. Cherry Valley Prairie was 1 mile west of Newark. Little Bowling Green Prairie was in an area in Bowling Green Township between the National Road and the Perry County line, and Plum Prairie was in an area in McKean Township along Brushy Fork *(15)*.

Cranberry Island, in Buckeye Lake, is a small bog that supports sphagnum moss and other wetland plants. It is a relict of a boreal forest that was in the survey area during the retreat of the last glacier thousands of years ago.

Agriculture

Agriculture is a primary industry and the primary land use in the county. In 1984, the county had 1,540 farms, which made up about 268,000 acres *(5)*. The average farm size was 174 acres. In that year, corn was grown on about 63,000 acres; soybeans on 49,600 acres; wheat on 13,000 acres; and hay on 27,000 acres. Most of the farmed areas are in the western half of the county. The farmed areas in the hilly eastern part are used mainly as pasture or hayland, but some areas are used as cropland.

In 1984, the income derived from farm products in the county was about 94 million dollars *(14)*. About 73 percent of the income was derived from the sale of livestock and livestock products and 27 percent from the sale of grain crops, hay, nursery crops, vegetables, and fruit. In order of economic importance, the chief farm products in 1984 were poultry and eggs, soybeans, corn, dairy products, cattle and calves, hogs, greenhouse and nursery plants, wheat, oats, and hay *(14)*.

Natural Resources

The natural resources in Licking County include water, sand and gravel deposits, oil and natural gas, and some layers of bedrock.

Licking County has a good supply of surface water and ground water. Adequate supplies of ground water for farm and domestic needs are available in most areas throughout the county, but an adequate supply should be established before rural buildings are constructed. The main source of water for the city of Newark is the North Fork of the Licking River.

The quality and quantity of ground water are largely determined by the type of aquifer that supplies the water. The largest amount of ground water is supplied by outwash deposits in the valleys along the North and South Forks of the Licking River and along Raccoon Creek. Pumping rates of 100 to 500 gallons per minute are common in these areas. Pumping rates of 5 to 25 gallons per minute are common in most of the other areas in the county *(7, 13)*.

In the western part of the county, many wells must be drilled through thick deposits of glacial drift in order to reach the underlying Mississippian-age bedrock. In these areas water is sometimes obtained from thin, discontinuous layers of sand and gravel in the till deposits. Pumping rates in these wells are generally 5 gallons per minute or less.

In the central and eastern parts of the county, most of the ground water is obtained from the Pennsylvanian and Mississippian systems of bedrock. Water-bearing strata include the Pottsville and Allegheny Formations in the Pennsylvanian bedrock and the Logan and Cuyahoga Formations and Berea Sandstone in the Mississippian bedrock.

Sand and gravel are mined mainly from the major outwash terraces along the Licking River and its major tributaries. They also are mined from kames in scattered areas throughout the glaciated part of the county, from some terraces along the smaller streams, and from some creekbeds.

Shallow wells in the Berea Sandstone of the Mississippian bedrock system and deeper wells in the "Clinton" sands of the Silurian system produce oil and gas. Brine wells supply Newark with salt for ice and snow control in winter. Brine also is used in some nearby areas to reduce the extent of road dust in summer.

Rock quarries in the county have provided some building stone for local use. One quarry near Hanover furnishes sandy shale of the Vinton member of the Logan Formation. The shale is used in the manufacture of tile and bricks.

Scattered areas in the southeastern part of the county have been surface mined for deposits of low-sulfur coal in the Pottsville Formation.

History

At one time Indians inhabited the area now known as Licking County. Flint Ridge, in Hopewell Township, was a major source of flint for arrowheads and other implements used by the Indians. Some large prehistoric earthworks are preserved in the Newark area.

The first settlers in the survey area arrived from New England, New Jersey, Pennsylvania, Virginia, Wales, and Germany shortly after the Wayne Treaty of 1795. Emigrants who had sympathized with the American Revolution and were forced to abandon their homes in British provinces settled on the Refugee Tract, 100,000 acres of land that Congress set aside in southern Licking, Fairfield, and Perry Counties.

Licking County was formed from a part of Fairfield County on March 1, 1808. It was named after the Licking River, the principal stream of the county *(15)*.

John Chapman, the legendary Johnny Appleseed, periodically traveled about the county between 1803 and 1820. He established apple orchards for the new settlers.

Ground breaking for the Ohio Canal took place at Licking Summit, which is just outside Newark, on July 4, 1825 *(15)*. In 1852, the first railroad in the county was extended to Newark.

The population of Licking County was 11,861 in 1820 and 40,050 in 1880 *(15)*. It was 59,962 in 1930 and 120,981 in 1980 *(25)*. The area of highest population is in the center of the county, in the cities of Newark and Heath. The population of this area was about 78,600 in 1980.

Transportation Facilities

Licking County has a well developed network of roads, including 13 state highways, 2 U.S. highways, and Interstate Highway 70, which crosses the county from east to west. The county is served by one east-west railroad. A branch extends north to Butler. Another line extends east from Newark to Zanesville. Air transportation is available at the Licking County Airport, the smaller Buckeye Valley Airport, and the nearby Port Columbus International Airport.

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 biological 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 a considerable degree of 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, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot 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 soil survey of Licking County published in 1938 *(26)*, other published literature, especially material dealing with the geology and soils of the county, and soil survey maps of individual farms made from 1944 to 1977 for conservation planning were among the references used at the start of the survey.

Before the fieldwork began, a general reconnaissance of the major soils and landforms of the entire county was made by car. Soil map units were delineated on aerial photographs taken in 1976 at a scale of 1:38,000 and enlarged to a scale of 1:15,840. Before an area was mapped, the aerial photography and United States Geological Survey topographic maps at a scale of 1:24,000 were used to study the landscape and its topography. In areas that have significant relief, preliminary boundaries of slopes and landforms were stereoscopically plotted on the aerial photo base map. Surface drainage was mapped in the field through the use of aerial photo patterns where applicable.

As they mapped the county, soil scientists traversed the landscape on foot to examine the soils and relate them to the landscape. They used hand augers and spades to examine the soils to a depth of about 4 to 6 feet or to bedrock within a depth of 6 feet.

Most of the traverses were made at intervals of about 200 to 500 yards, depending on the landscape and soil pattern *(16)*. Soil examinations along the traverses were made at selected spots typical of the area being depicted on the maps. In most areas these observations were made at intervals of 100 to 500 yards. Observations of the more shallow soils were made at closer intervals. Such items as landforms, vegetation, and exposed soil profiles were observed in road cuts, along pipelines, and in windthrow pits.

On the maps, the soil scientists depicted areas on the landscape that have different land use patterns and management concerns. The boundaries between these areas were determined on the basis of soil examinations, aerial photo interpretation, and other observations in the field. Cultural features were recorded from visual observations.

At the beginning of the survey, sample areas were selected to represent the major landforms in the county. These preliminary study areas were intensively mapped, and extensive field observations were made of the soils and composition of map units. As the survey progressed, notes were made on field observations, transects to study map unit composition were made, and soil samples were taken. The typical pedons were studied in pits. These pits were dug mostly by hand, but a few were dug with a backhoe.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred by hand to another set of the same photographs during map finishing.

Samples of some of the most extensive soils in the county were taken for chemical analysis, physical analysis, and engineering properties. 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 analysis of engineering properties was 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 and results can be obtained on request from these laboratories. The results of laboratory analyses also can be obtained from the Soil Conservation Service, State Office, Columbus, Ohio, and the Ohio Department of Natural Resources, Division of Soil and Water Conservation, Columbus, Ohio.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

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

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

Some soil boundaries and soil names in this survey do not fully match those in previously published surveys of adjoining counties. Differences are the result of changes and refinements of series concepts and application of the latest soil classification system.

Soil Descriptions

Nearly Level to Sloping Soils Formed in Glacial Till

These soils make up about 33 percent of the county. They are deep, nearly level to sloping, moderately well drained to very poorly drained soils on till plains. They formed in glacial till. They are used mainly as cropland or pasture. Some areas are used for woodland or urban development. Seasonal wetness, moderately slow or slow permeability, and ponding are the major limitations affecting cropland and nonfarm uses in nearly level and gently sloping areas. The slope and the hazard of erosion are limitations in some areas.

1. Bennington-Pewamo-Centerburg Association

Nearly level and gently sloping, somewhat poorly drained, very poorly drained, and moderately well drained soils; on till plains

This association is mainly on a ground moraine that is characterized by relatively broad flats, low knolls, and ridges interspersed with shallow swales. Where unvegetated, the soils have a striking mottled pattern of light and dark colors. Slopes range from 0 to 6 percent.

This association makes up about 12 percent of the county. It is about 45 percent Bennington soils, 30 percent Pewamo soils, 15 percent Centerburg soils, and 10 percent soils of minor extent.

Bennington soils are deep, nearly level and gently sloping, and somewhat poorly drained. They are on broad flats and low knolls. Permeability is slow. These soils have a perched seasonal high water table between depths of 12 and 30 inches during extended wet periods. They formed in glacial till. Typically, they have a surface layer of dark grayish brown silt loam. The subsoil is yellowish brown and dark yellowish brown, mottled silt loam, silty clay loam, clay loam, and loam.

Pewamo soils are deep, nearly level, and very poorly drained. They are on broad flats, in depressions, and along drainageways. Permeabililty is moderately slow. These soils have a seasonal high water table near or above the surface and are subject to ponding after periods of heavy rain. They formed in glacial till. Typically, they have a surface layer of very dark grayish brown silty clay loam. The subsoil is multicolored, mottled silty clay loam.

Centerburg soils are deep, gently sloping, and moderately well drained. They are on knolls and ridges. Permeability is moderately slow. A perched seasonal high water table is between depths of 18 and 36 inches during extended wet periods. These soils formed in glacial till. Typically, the surface layer is brown silt loam. The subsoil is yellowish brown and dark yellowish brown silt loam, silty clay loam, and clay loam. It is mottled in the middle and lower parts.

Minor in this association are seeps and springs on some side slopes and Shoals and Sloan soils on narrow flood plains. Shoals and Sloan soils formed in recent alluvium.

Most areas of this association are used as cropland. Some areas are pastured or wooded. A few areas are being developed for urban uses. The soils are well suited to grain crops, hay, pasture, and trees. They are poorly suited or moderately suited to buildings and septic tank absorption fields.

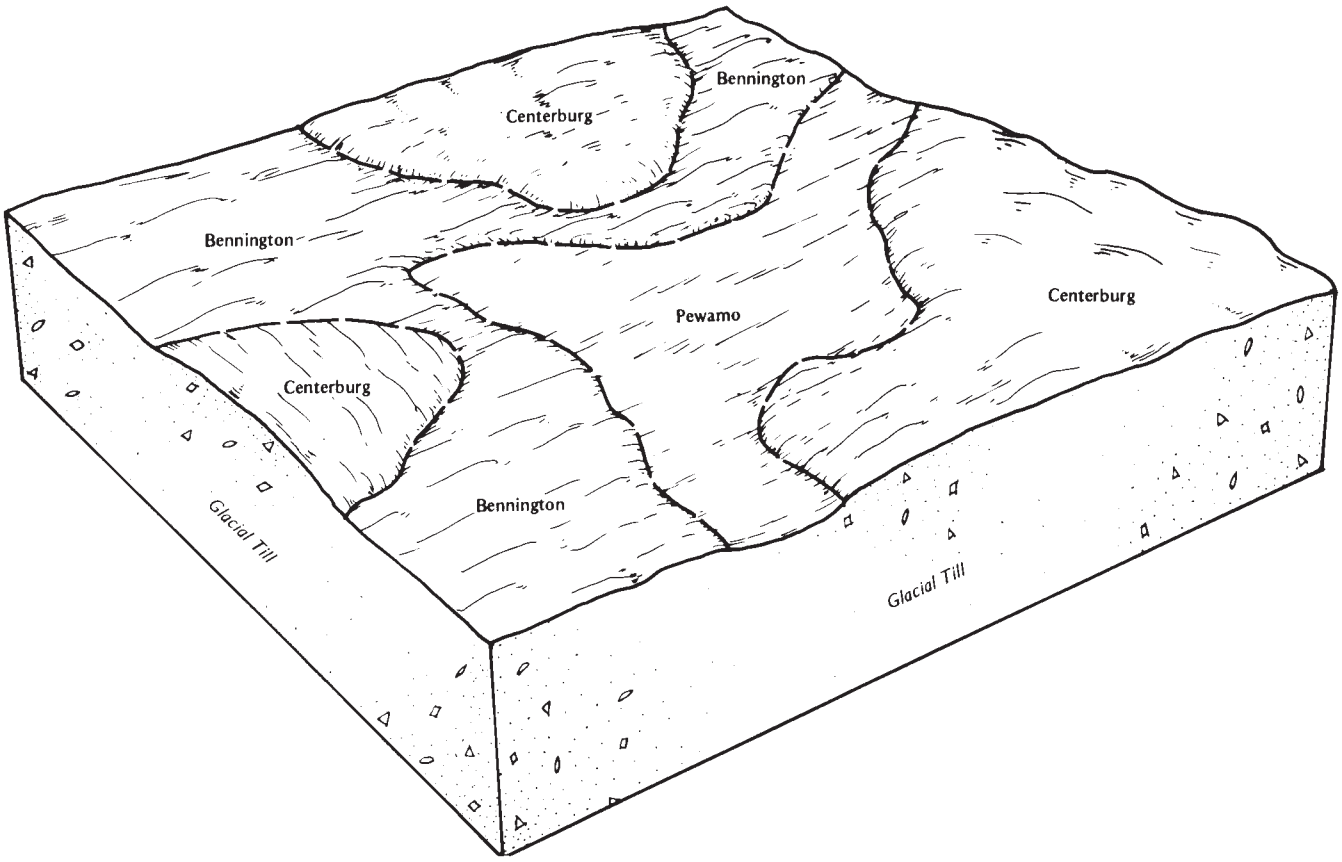

Figure 4.—Typical pattern of soils and parent material in the Centerburg-Bennington-Pewamo association.

Seasonal wetness, ponding, and slow or moderately slow permeability are the main limitations affecting farming and nonfarm uses. Surface and subsurface drains are commonly used to remove excess water in areas of the Bennington and Pewamo soils. Surface crusting after hard rains is a management concern in cultivated areas of the Bennington and Centerburg soils. Maintaining tilth is a management concern if these soils are worked when they are too wet. Controlling erosion in areas of the gently sloping Bennington and Centerburg soils also is a management concern. Properly landscaping building sites helps to keep surface water away from foundations.

2. Centerburg-Bennington-Pewamo Association

Nearly level to sloping, moderately well drained, somewhat poorly drained, and very poorly drained soils; on till plains

This association is in undulating areas on end moraines interspersed with small areas of ground moraines. Slopes range from 0 to 12 percent (fig. 4).

This association makes up about 21 percent of the county. It is about 40 percent Centerburg soils, 30 percent Bennington soils, 15 percent Pewamo soils, and 15 percent soils of minor extent.

Centerburg soils are deep, gently sloping and sloping, and moderately well drained. They are on knolls, on ridges, and on side slopes along drainageways. Permeability is moderately slow. These soils have a perched seasonal high water table between depths of 18 and 36 inches during extended wet periods. They formed in glacial till. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown and dark yellowish brown silt loam, silty clay loam, and clay loam. It is mottled in the middle and lower parts.

Bennington soils are deep, nearly level and gently sloping, and somewhat poorly drained. They are on flats and low knolls. Permeability is slow. These soils have a perched seasonal high water table between depths of 12 and 30 inches during extended wet periods. They formed in glacial till. Typically, they have a surface layer of dark grayish brown silt loam. The subsoil is yellowish

brown and dark yellowish brown, mottled silt loam, silty clay loam, clay loam, and loam.

Pewamo soils are deep, nearly level, and very poorly drained. They are on broad flats, in depressions, and along drainageways. Permeability is moderately slow. These soils have a seasonal high water table near or above the surface and are subject to ponding after periods of heavy rain. They formed in glacial till. Typically, they have a surface layer of very dark grayish brown silty clay loam. The subsoil is multicolored, mottled silty clay loam.

Minor in this association are seeps and springs on some side slopes and the somewhat poorly drained Shoals soils on narrow flood plains along small streams.

Most areas of this association are used as cropland. Some areas are pastured or wooded. The soils are well suited or moderately well suited to grain crops. They are well suited to hay, pasture, and trees. They are moderately suited or poorly suited to buildings and septic tank absorption fields.

Seasonal wetness and the hazard of erosion are the major limitations affecting cropland. Surface and subsurface drains are commonly used to remove excess water in areas of the Bennington and Pewamo soils where adequate outlets are available. A system of conservation tillage that leaves crop residue on the surface and crop rotations that include grasses and legumes help to control erosion. Surface crusting after heavy rain is a management concern in cultivated areas of the Centerburg and Bennington soils. Maintaining tilth is a management concern if these soils are worked when they are too wet. Seasonal wetness, ponding, and slow or moderately slow permeability are the main limitations affecting homesites and septic tank absorption fields. Properly landscaping building sites helps to keep surface water away from foundations and helps to control erosion. Because of the better natural drainage, the Centerburg soils are somewhat better suited to some urban uses than the Bennington and Pewamo soils.

Gently Sloping to Very Steep Soils Formed in Glacial Till, Colluvium, and Residuum

These soils make up about 20 percent of the county. They are deep, gently sloping to very steep, well drained and moderately well drained soils on glaciated and unglaciated uplands. They formed in Wisconsinan glacial till, colluvium, and material weathered from siltstone and fine grained sandstone. The gently sloping to moderately steep soils are used mainly as cropland or pasture. The steep and very steep soils are used mainly as woodland. The hazard of erosion, the slope, moderately slow permeability, seasonal droughtiness, seasonal wetness, and the depth to bedrock are the major management concerns.

3. Centerburg-Amanda Association

Gently sloping to very steep, moderately well drained and well drained soils; on dissected parts of till plains

This association consists of gently sloping and sloping soils in undulating areas and interfluves and sloping to very steep soils in dissected areas along drainageways. Slopes range from 2 to 50 percent.

This association makes up about 15 percent of the county. It is about 45 percent Centerburg soils, 30 percent Amanda soils, and 25 percent soils of minor extent.

Centerburg soils are deep, gently sloping and sloping, and moderately well drained. They are on knolls, on ridges, and on side slopes along drainageways. Permeability is moderately slow. These soils have a perched seasonal high water table between depths of 18 and 36 inches during extended wet periods. They formed in glacial till. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown and dark yellowish brown silt loam, silty clay loam, and clay loam. It is mottled in the middle and lower parts.

Amanda soils are deep, gently sloping to very steep, and well drained. They are on knolls, on ridges, and on side slopes along drainageways. Permeability is moderately slow. A perched seasonal high water table is below a depth of 48 inches during extended wet periods. These soils formed in glacial till. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown silty clay loam and clay loam. It is mottled in the lower part.

Some of the minor soils in this association are the somewhat poorly drained Bennington soils on flats and in undulating areas, the somewhat poorly drained Shoals soils on narrow flood plains, and Ockley soils on narrow terrace remnants. Ockley soils have sand and gravel in the substratum.

The gently sloping to moderately steep soils in this association are used mainly as cropland or pasture. In some areas they are wooded. Most of the steep and very steep soils also are wooded. They are well suited to woodland. The less sloping soils are well suited to cropland and pasture, and the moderately steep soils are poorly suited or moderately suited. The gently sloping and sloping soils are moderately suited or well suited to buildings and moderately suited to septic tank absorption fields. The moderately steep and steep soils are poorly suited to buildings. They are poorly suited or generally unsuited to septic tank absorption fields. The very steep soils are generally unsuited to urban uses.

Controlling erosion and improving tilth are the main management concerns in farmed areas. The slope also is a major concern. Crop rotations that include grasses and legumes, grassed waterways, and a system of conservation tillage that leaves crop residue on the surface help to control erosion and improve tilth. The slope, seasonal wetness, and moderately slow permeability are limitations on sites for buildings and septic tank absorption fields. Construction sites should be protected against erosion.

4. Brownsville-Mechanicsburg-Amanda Association

Gently sloping to very steep, well drained soils; on glaciated and unglaciated uplands

This association is on narrow to broad ridgetops and on foot slopes and hillsides. The topography commonly ranges from undulating to hilly. Streams are small, and flood plains are relatively narrow. Slopes range from 2 to 70 percent.

This association makes up about 5 percent of the county. It is about 35 percent Brownsville soils, 20 percent Mechanicsburg soils, 20 percent Amanda soils, and 25 percent soils of minor extent.

Brownsville soils are deep and are sloping to very steep. They are on ridgetops and hillsides. Permeability is moderate or moderately rapid. These soils formed in colluvium and residuum derived from siltstone and fine grained sandstone. Typically, they have a surface layer of very dark grayish brown channery silt loam. The subsurface layer is brown channery silt loam. The subsoil is yellowish brown channery silt loam, very channery silt loam, and very channery loam.

Mechanicsburg soils are deep and are gently sloping to steep. They are on ridgetops and hillsides. Permeability is moderate. These soils formed in glacial till and in the underlying material weathered from fine grained sandstone and siltstone. Typically, they have a surface layer of brown silt loam. The upper part of the subsoil is yellowish brown silt loam and loam, and the lower part is yellowish brown channery loam and very channery silt loam.

Amanda soils are deep and are gently sloping to very steep. They are on knolls, on ridges, and on side slopes along drainageways. Permeability is moderately slow. A perched seasonal high water table is below a depth of 48 inches during extended wet periods. These soils formed in glacial till. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown silty clay loam and clay loam. It is mottled in the lower part.

Some of the minor soils in this association are Ockley soils on terraces, the somewhat poorly drained Shoals soils on narrow flood plains, and Amanda Variant soils on foot slopes. Ockley soils have sand and gravel in the substratum. Amanda Variant soils have more silt and less clay in the upper part than the major soils.

Most areas of this association are used for pasture or cash-grain farming. The less sloping soils are commonly used as cropland, and the steeper soils are pastured or wooded. The less sloping soils are well suited or moderately suited to grain crops, hay, pasture, and most urban uses. The steeper soils are generally unsuited or poorly suited to most of these uses. The major soils are well suited or moderately suited to woodland.

The main limitations affecting farming and building site development are the slope and the hazard of erosion. Droughtiness in the Brownsville and Mechanicsburg soils also is a management concern during extended dry periods. Crop rotations that include grasses and legumes, grassed waterways, and a system of conservation tillage that leaves crop residue on the surface help to control erosion, conserve moisture, and improve tilth. The slope of all the major soils, the moderately slow permeability in the Amanda soils, and the depth to bedrock in the Brownsville and Mechanicsburg soils are limitations on sites for septic tank absorption fields. Effluent that enters cracks in the underlying bedrock can move a considerable distance and pollute ground water. Construction sites should be protected against erosion wherever possible.

Gently Sloping to Very Steep Soils Formed in Loess, Glacial Till, Colluvium, and Residuum

These soils make up about 9 percent of the county. They are deep, gently sloping to very steep, well drained and moderately well drained soils on glaciated and unglaciated uplands. They formed in a variety of parent materials, including loess, Illinoian glacial till, and colluvium and residuum derived from sandstone, siltstone, and shale. The major land uses are farming in the less sloping areas and woodland in the steeper areas. The hazard of erosion, the slope, slow or moderately slow permeability, and seasonal wetness are the major management concerns.

5. Homewood-Brownsville-Coshocton Association

Gently sloping to very steep, well drained and moderately well drained soils; on glaciated and unglaciated uplands

This association is on ridgetops, foot slopes, and hillsides. The topography commonly ranges from undulating to hilly. Streams are small, and flood plains are relatively narrow. Slopes range from 2 to 70 percent.

This association makes up about 7 percent of the county. It is about 30 percent Homewood soils, 25 percent Brownsville soils, 10 percent Coshocton soils, and 35 percent soils of minor extent.

Homewood soils are deep, gently sloping to steep, and well drained and moderately well drained. They generally are on undulating till plains and dissected side slopes along narrow valleys. In some areas they are at the base of prominent hillsides. They have a fragipan in the lower part of the subsoil. Permeability is moderate above the fragipan and slow in the fragipan. A perched seasonal high water table is between depths of 30 and 48 inches during extended wet periods. These soils formed in glacial till. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown and strong brown clay loam.

Brownsville soils are deep, sloping to very steep, and well drained. They are on ridgetops and hillsides. Permeability is moderate or moderately rapid. These soils formed in colluvium and residuum derived from siltstone and fine grained sandstone. Typically, they have a surface layer of very dark grayish brown channery silt loam. The subsurface layer is brown channery silt loam. The subsoil is yellowish brown channery silt loam, very channery silt loam, and very channery loam.

Coshocton soils are deep, gently sloping to steep, and moderately well drained. They are on ridgetops and hillsides. Permeability is moderately slow or slow. A perched seasonal high water table is between depths of 18 and 36 inches during extended wet periods. These soils formed in colluvium and residuum derived from shale and siltstone. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown, strong brown, and light yellowish brown silt loam and silty clay loam in the upper part and light brownish gray and brown silty clay and silty clay loam in the lower part. It is mottled below a depth of about 15 inches.

Some of the minor soils in this association are Chili and Glenford soils on terraces, Mechanicsburg and Rigley soils on hillsides and ridgetops, and the somewhat poorly drained Orrville soils on narrow flood plains. Chili soils have sand and gravel in the lower part. Glenford soils have less sand and a lower content of coarse fragments in the subsoil than the major soils. Mechanicsburg soils have a lower content of coarse fragments in the subsoil than the Brownsville soils and a higher content of coarse fragments in the lower part than the Homewood and Coshocton soils. Rigley soils have more sand in the subsoil than the major soils.

The gently sloping to moderately steep soils are used mainly as cropland or pasture, and the steep and very steep soils generally are wooded (fig. 5). The less sloping soils are well suited or moderately suited to cropland, hay, and pasture and are moderately suited or poorly suited to buildings and septic tank absorption fields. The steeper soils are generally unsuited to these uses. The major soils are well suited or moderately suited to trees.

The slope and the hazard of erosion are the major limitations affecting most land uses. Seasonal wetness and slow or moderately slow permeability are additional limitations in areas of the Homewood and Coshocton soils. The Brownsville soils are droughty during extended dry periods. Crop rotations that include grasses and legumes, grassed waterways, and a system of conservation tillage that leaves crop residue on the surface help to control erosion and improve tilth. Construction sites should be protected against erosion wherever possible.

6. Cincinnati-Homewood-Coshocton Association

Gently sloping to steep, well drained and moderately well drained soils; on glaciated and unglaciated uplands

This association is on ridgetops, foot slopes, and hillsides. The topography commonly ranges from undulating to hilly. Streams are small, and flood plains are relatively narrow. Slopes range from 2 to 25 percent.

This association makes up about 2 percent of the county. It is about 25 percent Cincinnati soils, 25 percent Homewood soils, 15 percent Coshocton soils, and 35 percent soils of minor extent.

Cincinnati soils are deep, gently sloping and sloping, and well drained. They are on knolls, ridges, and side slopes. They have a fragipan in the middle part of the subsoil. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan. A perched seasonal high water table is between depths of 30 and 48 inches during extended wet periods. These soils formed in loess and in the underlying glacial till. Typically, they have a surface layer of brown silt loam. The upper part of the subsoil is strong brown silt loam, and the lower part is yellowish brown, mottled loam and clay loam.

Homewood soils are deep, gently sloping to steep, and well drained and moderately well drained. They generally are on side slopes along narrow valleys. In some areas they are at the base of prominent hillsides. They have a fragipan in the lower part of the subsoil. Permeability is moderate above the fragipan and slow in the fragipan. A perched seasonal high water table is between depths of 30 and 48 inches during extended wet periods. These soils formed in glacial till. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown and strong brown clay loam.

Coshocton soils are deep, gently sloping to steep,

Figure 5.—Typical land use pattern in the Homewood-Brownsville-Coshocton association. Cropland, pasture, and woodland are the dominant land uses.

and moderately well drained. They are on ridgetops and hillsides. Permeability is moderately slow or slow. A perched seasonal high water table is between depths of 18 and 36 inches during extended wet periods. These soils formed in colluvium and residuum derived from shale and siltstone. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown, strong brown, and light yellowish brown silt loam and silty clay loam in the upper part and light brownish gray and brown silty clay and silty clay loam in the lower part. It is mottled below a depth of about 15 inches.

Some of the minor soils in this association are Glenford and Mentor soils on terraces, Killbuck soils on flood plains, Alford soils on ridgetops, and Brownsville soils on the steeper parts of hillsides. Alford, Glenford, and Mentor soils have more silt in the upper part of the subsoil than the Coshocton and Homewood soils and do not have a fragipan. Killbuck soils are poorly drained. Brownsville soils have a higher content of coarse fragments in the subsoil than the major soils.

Most of the gently sloping to moderately steep soils are used as cropland or pasture. The steep soils are mainly wooded. The less sloping soils are well suited or moderately suited to grain crops and well suited to hay and pasture. They are moderately suited to buildings and poorly suited to septic tank absorption fields. The steeper soils are generally unsuited or poorly suited to grain crops and hay. They are moderately suited to pasture, poorly suited to buildings, and generally unsuited to septic tank absorption fields.

The main limitations affecting most land uses are the slope, the hazard of erosion, seasonal wetness, and slow or moderately slow permeability. Crop rotations that include grasses and legumes, contour stripcropping, and a system of conservation tillage that leaves crop residue on the surface help to control erosion and improve tilth. Construction sites should be protected against erosion wherever possible.

Gently Sloping to Very Steep Soils Formed in Colluvium, Residuum, and Loess

These soils make up about 20 percent of the county. They are deep, gently sloping to very steep, well drained and moderately well drained soils on ridgetops and hillsides. They formed in colluvium and residuum derived from sandstone, siltstone, shale, and flinty limestone. They are used mainly as cropland, pasture, or woodland. The slope, the hazard of erosion, the

depth to bedrock, slow or moderately slow permeability, seasonal wetness, stoniness, and seasonal droughtiness are the major management concerns.

7. Brownsville-Coshocton Association

Gently sloping to very steep, well drained and moderately well drained soils; on unglaciated uplands

This association is on ridgetops and hillsides. The maximum difference in local relief commonly is about 200 feet. Streams are small, and flood plains are relatively narrow. Slopes range from 2 to 70 percent.

This association makes up about 13 percent of the county. It is about 45 percent Brownsville soils, 20 percent Coshocton soils, and 35 percent soils of minor extent (fig. 6). The proportion of Coshocton soils is higher near the Muskingum County line than farther west.

Brownsville soils are deep, sloping to very steep, and well drained. They are on ridgetops and hillsides. Permeability is moderate or moderately rapid. These soils formed in colluvium and residuum derived from siltstone and fine grained sandstone. Typically, they have a surface layer of very dark grayish brown channery silt loam. The subsurface layer is brown channery silt loam. The subsoil is yellowish brown channery silt loam, very channery silt loam, and very channery loam.

Coshocton soils are deep, gently sloping to steep, and moderately well drained. They are on ridgetops and hillsides. Permeability is moderately slow or slow. A perched seasonal high water table is between depths of 18 and 36 inches during extended wet periods. These soils formed in colluvium and residuum derived from shale and siltstone. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown, strong brown, and light yellowish brown silt loam and silty clay loam in the upper part and light brownish gray and brown silty clay and silty clay loam in the lower part. It is mottled below a depth of about 15 inches.

Some of the minor soils in this association are Clarksburg soils on foot slopes, Orrville soils on narrow

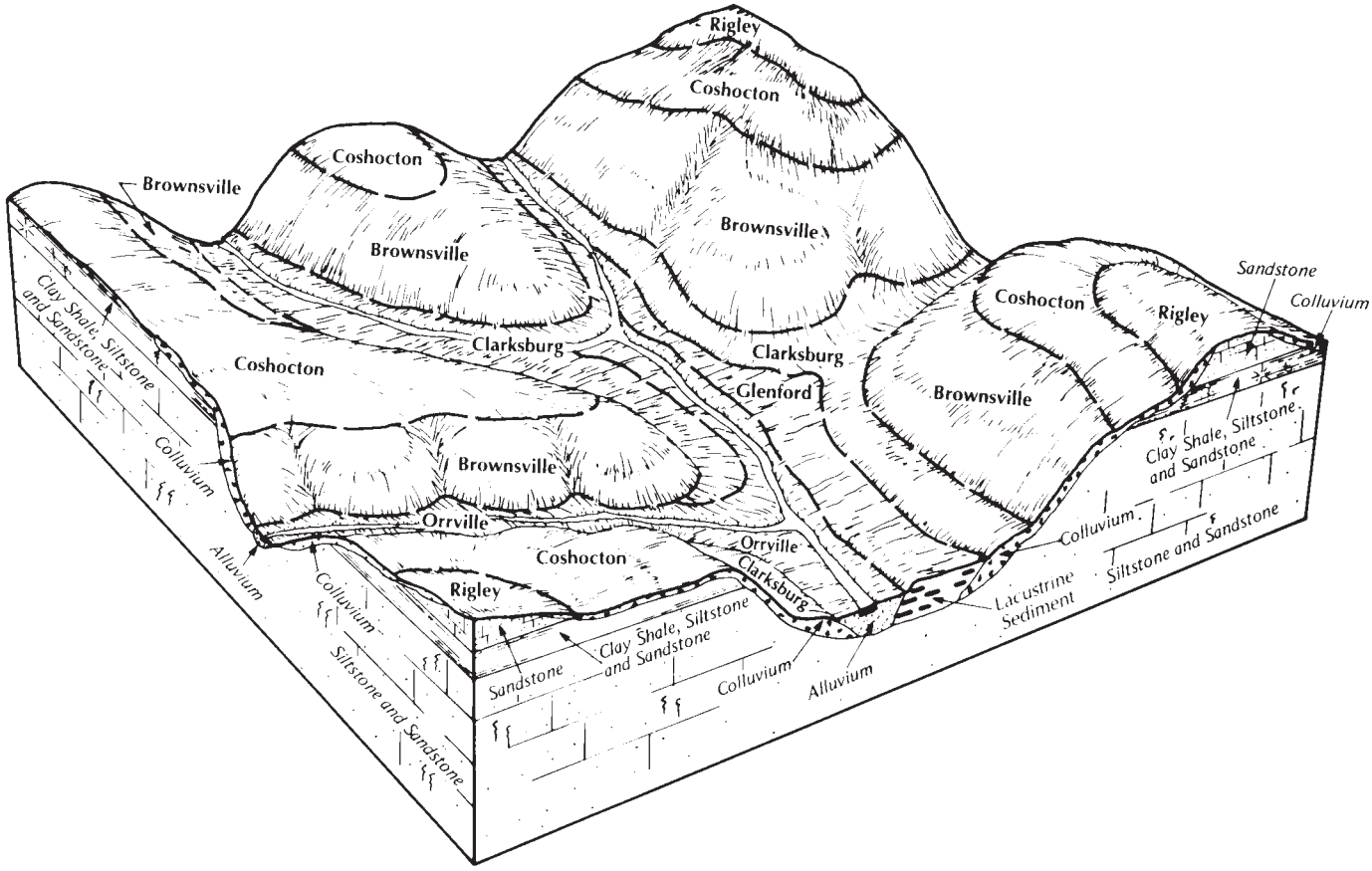

Figure 6.—Typical pattern of soils and parent material in the Brownsville-Coshocton association.

flood plains, Glenford soils on terraces, and Rigley soils on hillsides and ridgetops. Clarksburg soils have a fragipan. Orrville soils are somewhat poorly drained. Glenford soils have a lower content of sand and coarse fragments in the upper part than the major soils, and Rigley soils have more sand in the subsoil.

The less sloping soils on ridgetops are used mainly as cropland or pasture. The hillsides are wooded or are used as pasture. Some areas that were previously farmed support brush or are reverting to woodland. The less sloping soils are well suited or moderately suited to row crops and small grain and well suited to pasture and hay. They are moderately suited to buildings and poorly suited to septic tank absorption fields. The steeper soils are generally unsuited to most uses. They are well suited or moderately suited to woodland.

The main limitations affecting most uses are the slope and the hazard of erosion in both of the major soils and the seasonal wetness and slow or moderately slow permeability in the Coshocton soils. The Brownsville soils are droughty during extended dry periods. Crop rotations that include grasses and legumes, contour stripcropping, and a system of conservation tillage that leaves crop residue on the surface help to control erosion, conserve moisture, and improve tilth. Construction sites should be protected against erosion wherever possible.

8. Coshocton-Rigley Association

Sloping to very steep, moderately well drained and well drained soils; on unglaciated uplands

This association is on ridgetops and hillsides. The maximum difference in local relief commonly is about 250 feet. Streams are small, and flood plains are relatively narrow. Slopes range from 6 to 35 percent.

This association makes up about 6 percent of the county. It is about 40 percent Coshocton soils, 20 percent Rigley soils, and 40 percent soils of minor extent.

Coshocton soils are deep, sloping to steep, and moderately well drained. They are on ridgetops and hillsides. Permeability is moderately slow or slow. A perched seasonal high water table is between depths of 18 and 36 inches during extended wet periods. These soils formed in colluvium and residuum derived from shale and siltstone. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown, strong brown, and light yellowish brown silt loam and silty clay loam in the upper part and light brownish gray and brown silty clay and silty clay loam in the lower part. It is mottled below a depth of about 15 inches.

Rigley soils are deep, sloping to very steep, and well drained. They are on ridgetops and hillsides. Permeability is moderately rapid. These soils formed in colluvium and residuum derived from sandstone. Typically, they have a surface layer of very dark grayish brown fine sandy loam. The subsurface layer is brown fine sandy loam. The subsoil is yellowish brown and brownish yellow sandy loam.

Some of the minor soils in this association are Glenford and Mentor soils on terraces, Brownsville soils on the lower parts of hillsides, and Orrville soils on narrow flood plains. Glenford and Mentor soils have a lower content of sand and coarse fragments in the upper part than the major soils. Brownsville soils have a higher content of coarse fragments throughout than the major soils. Orrville soils are somewhat poorly drained.

The less sloping soils on ridgetops are used mainly as cropland or pasture. The steeper soils are wooded. Many previously farmed areas are reverting to woodland or support brush. The less sloping soils on ridgetops are moderately suited or poorly suited to row crops, small grain, buildings, and septic tank absorption fields. They are well suited or moderately suited to hay, pasture, and trees. The steeper soils are generally unsuited to most uses. They are well suited or moderately suited to woodland.

The main limitations affecting most uses are the slope and the hazard of erosion in both of the major soils, droughtiness in the Rigley soils, and seasonal wetness and slow or moderately slow permeability in the Coshocton soils. Crop rotations that include grasses and legumes, contour stripcropping, and a system of conservation tillage that leaves crop residue on the surface help to control erosion, conserve moisture, and improve tilth. Construction sites should be protected against erosion wherever possible.

9. Guernsey-Mertz-Coshocton Association

Gently sloping to very steep, moderately well drained and well drained soils; on unglaciated uplands

This association is on relatively broad ridgetops and moderately steep to very steep side slopes. It is on the Flint Ridge, a major prehistoric Indian quarry site. Slopes range from 2 to 35 percent.

This association makes up about 1 percent of the county. It is about 25 percent Guernsey soils, 15 percent Mertz soils, 15 percent Coshocton soils, and 45 percent soils of minor extent.

Guernsey soils are deep, gently sloping to moderately steep, and moderately well drained. They are on ridgetops and hillsides. Permeability is slow or moderately slow. A perched seasonal high water table is between depths of 24 and 42 inches. These soils

formed in a thin mantle of loess and in the underlying material weathered from shale and siltstone. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown silt loam and silty clay loam in the upper part, brownish yellow silty clay in the next part, and light brownish gray and yellowish brown silty clay loam in the lower part. It is mottled below a depth of about 11 inches.

Mertz soils are deep, gently sloping to very steep, and well drained. They are on ridgetops and side slopes. Permeability is moderately slow. These soils formed in material weathered from flinty limestone and are very stony. Typically, they have a surface layer of very dark grayish brown very cherty silt loam. The subsurface layer is brown very cherty silt loam. The subsoil is yellowish brown, strong brown, and yellowish red very cherty silt loam and red and strong brown very cherty silty clay loam.

Coshocton soils are deep, gently sloping to moderately steep, and moderately well drained. They are on ridgetops and hillsides. Permeability is moderately slow or slow. A perched seasonal high water table is between depths of 18 and 36 inches during extended wet periods. These soils formed in colluvium and residuum derived from shale and siltstone. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown, strong brown, and light yellowish brown silt loam and silty clay loam in the upper part and light brownish gray and brown silty clay and silty clay loam in the lower part. It is mottled below a depth of about 15 inches.

Some of the minor soils in this association are Alford and Frankstown Variant soils on ridgetops, Rigley soils on hillsides, and Orrville soils on narrow flood plains. Alford soils have a lower content of sand and coarse fragments in the upper part than the major soils. Frankstown Variant soils are moderately deep over bedrock. Rigley soils have more sand in the subsoil than the major soils. Orrville soils are somewhat poorly drained.

The less sloping soils are used as cropland, pasture, or woodland. The steeper soils are used mainly as woodland. The less sloping Guernsey and Coshocton soils are well suited or moderately suited to grain crops. They are well suited to hay, pasture, and trees. They are moderately suited to buildings and poorly suited to septic tank absorption fields. The Mertz soils are generally unsuited to cropland and pasture and are well suited to trees. The less sloping Mertz soils are well suited to buildings and moderately suited to septic tank absorption fields. The steeper Mertz soils are poorly suited or generally unsuited to urban uses.

The slope and the hazard of erosion in all of the major soils, stoniness and droughtiness in the Mertz soils, and the seasonal wetness and slow or moderately slow permeability in the Guernsey and Coshocton soils are the major management concerns. Crop rotations that include grasses and legumes, grassed waterways, and a system of conservation tillage that leaves crop residue on the surface help to control erosion, conserve moisture, and improve tilth. Construction sites should be protected against erosion wherever possible.

Nearly Level to Very Steep Soils Formed in Loess and Glacial Outwash

These soils make up about 2 percent of the county. They are deep, well drained, nearly level to very steep soils on Illinoian glacial outwash terraces and kames. They formed in loess and glacial outwash. They are used mainly as cropland, pasture, or woodland. The slope and the hazard of erosion are the main management concerns.

10. Alford-Negley-Parke Association

Nearly level to very steep, well drained soils; on outwash terraces and kames

This association generally is on broad, nearly level and undulating, high Illinoian glacial outwash terraces and on steep and very steep, dissected side slopes. In some areas it is on kames. Streams are small, and flood plains are narrow. Slopes range from 0 to 70 percent.

This association makes up about 2 percent of the county. It is about 35 percent Alford soils, 25 percent Negley soils, 20 percent Parke soils, and 20 percent soils of minor extent.

Alford soils are deep and are nearly level to sloping. They are on broad terraces. Permeability is moderate. These soils formed in loess. Typically, they have a surface layer of brown silt loam. The subsoil is yellowish brown silt loam and silty clay loam. It is mottled below a depth of about 30 inches.

Negley soils are deep and are sloping to very steep. They are on kames and outwash terraces. Permeability is moderate or moderately rapid. These soils formed in glacial outwash. Typically, they have a surface layer of brown loam. The subsoil is yellowish brown, strong brown, and yellowish red loam, clay loam, and gravelly clay loam.

Parke soils are deep and sloping. They are on relatively narrow side slopes between the less sloping Alford soils and the steeper Negley soils. Permeability is moderate. These soils formed in loess and in the underlying glacial outwash. Typically, they have a surface layer of brown silt loam. The upper part of the

subsoil is strong brown silt loam and silty clay loam, and the lower part is strong brown loam and reddish brown gravelly sandy loam.

Minor in this association are Fitchville soils on slack-water terraces along small streams and Orrville soils on narrow flood plains. The minor soils are somewhat poorly drained.

The less sloping soils in this association are used as cropland. Some areas are pastured, and a few areas are wooded. The steeper soils generally are wooded. The less sloping soils are well suited or moderately suited to most uses. The steeper soils are poorly suited or generally unsuited to most uses. They are well suited to woodland.

The slope and the hazard of erosion are the major management concerns. Crop rotations that include grasses and legumes, grassed waterways, and a system of conservation tillage that leaves crop residue on the surface help to control erosion and improve tilth. Construction sites should be protected against erosion wherever possible.

Nearly Level to Moderately Steep Soils Formed in Loess, Glacial Outwash, Alluvium, and Lacustrine Sediment

These soils make up about 16 percent of the county. They are deep, nearly level to moderately steep, well drained to very poorly drained soils on flood plains, lake plains, and outwash and slack-water terraces. They formed in loess, glacial outwash, alluvium, or lacustrine sediment. They are used mainly as cropland or for residential, commercial, or industrial development. Wetness and the hazards of flooding and erosion are the main management concerns. Droughtiness, the slope, moderately slow permeability, and ponding are additional concerns.

11. Ockley-Stonelick-Shoals Association

Nearly level to sloping, well drained and somewhat poorly drained soils; on outwash terraces and flood plains

This association is on broad outwash terrace benches and flood plains. Short, narrow slope breaks are between the benches and flood plains. Slopes range from 0 to 12 percent.

This association makes up about 11 percent of the county. It is about 35 percent Ockley soils, 15 percent Stonelick soils, 10 percent Shoals soils, and 40 percent soils of minor extent.

Ockley soils are deep, nearly level to sloping, and well drained. They are on broad flats, in slightly undulating areas, and on slope breaks. Permeability is moderate in the subsoil and very rapid in the substratum. These soils formed in a thin mantle of loess and in the underlying glacial outwash. Typically, they have a surface layer of brown silt loam. The upper part of the subsoil is yellowish brown silt loam, silty clay loam, and clay loam, and the lower part is brown and dark yellowish brown clay loam, sandy clay loam, and gravelly clay loam.

Stonelick soils are deep, nearly level, and well drained. They are on flood plains and are occasionally flooded. Permeability is moderately rapid. These soils formed in alluvium. Typically, they have a surface layer and subsurface layer of brown loam and a substratum of dark yellowish brown and yellowish brown, stratified fine sandy loam, silt loam, and loamy sand.

Shoals soils are deep, nearly level, and somewhat poorly drained. They are on flood plains and are occasionally flooded. Permeability is moderate. A seasonal high water table is between depths of 6 and 18 inches during extended wet periods. These soils formed in alluvium. Typically, they have a surface layer of dark grayish brown silt loam. The substratum is grayish brown, yellowish brown, and gray, mottled loam, silt loam, silty clay loam, and gravelly loam.

Some of the minor soils in this association are Fitchville, Fox, Sleeth, and Westland soils on terraces and the moderately well drained Medway soils on flood plains. Also of minor extent are areas of Urban land and a few gravel pits. Fitchville soils have more silt and less sand throughout than the major soils. Fox soils are shallower to sand and gravel than the Ockley soils. Sleeth and Westland soils are wetter than the Ockley soils.

Most areas of this association are used as cropland. A few areas are pastured or wooded. Some areas have been developed for industrial, commercial, or residential uses. The nearly level and gently sloping Ockley soils are well suited to grain crops, hay, pasture, trees, and some specialty crops. They also are well suited to buildings and septic tank absorption fields. The sloping Ockley soils are moderately suited to grain crops and to buildings and septic tank absorption fields. The Shoals and Stonelick soils are well suited to row crops, hay, pasture, and trees. They generally are unsuitable as sites for buildings and septic tank absorption fields.

The slope and the hazard of erosion in areas of the Ockley soils, the hazard of flooding on the Stonelick and Shoals soils, droughtiness in the Stonelick soils, and seasonal wetness in the Shoals soils are the major management concerns. The flooding damages small grain in some areas. Also, the floodwater often deposits sediments on hayland and pasture. Surface crusting after hard rains is a management concern in cultivated areas of the Ockley and Shoals soils. Crop rotations that include grasses and legumes, grassed waterways,

and a system of conservation tillage that leaves crop residue on the surface help to control erosion, minimize crusting, and improve tilth.

12. Luray-Westland-Ockley Association

Nearly level to sloping, very poorly drained and well drained soils; on lake plains and terraces

This association is on low rises on lake plains and outwash terraces. In some cultivated areas, the soils have a pattern of light and dark colors. Slopes range from 0 to 12 percent.

This association makes up about 1 percent of the county. It is about 35 percent Luray soils, 30 percent Westland soils, 20 percent Ockley soils, and 15 percent soils of minor extent.

Luray soils are deep, nearly level, and very poorly drained. They are on flats and in swales on lake plains and terraces along streams. Permeability is moderately slow. These soils have a seasonal high water table near or above the surface and are subject to ponding after periods of heavy rain. They formed in lacustrine deposits. Typically, they have a surface layer of very dark gray silty clay loam. The subsurface layer is black silty clay loam. The subsoil is dark grayish brown and dark gray, mottled silty clay loam and silt loam.

Westland soils are deep, nearly level, and very poorly drained. They are on flats and in depressions on outwash terraces. Permeability is moderate in the subsoil and very rapid in the substratum. These soils have a seasonal high water table near or above the surface and are subject to ponding after periods of heavy rain. They formed in glacial outwash. Typically, they have a surface layer and subsurface layer of black silty clay loam. The subsoil is gray and dark gray, mottled clay loam, loam, and gravelly sandy loam.

Ockley soils are deep, nearly level to sloping, and well drained. They are on low rises and knolls on outwash terraces. Permeability is moderate in the subsoil and very rapid in the substratum. These soils formed in a thin mantle of loess and in the underlying glacial outwash. Typically, they have a surface layer of brown silt loam. The upper part of the subsoil is yellowish brown silt loam, silty clay loam, and clay loam, and the lower part is brown and dark yellowish brown clay loam, sandy clay loam, and gravelly clay loam.

Some of the minor soils in this association are the moderately well drained Centerburg and Glenford soils and the somewhat poorly drained Fitchville and Sleeth soils. Centerburg soils are on knolls. Fitchville, Glenford, and Sleeth soils are on flats and slight rises.

Most areas of this association are used as cropland. The soils are well suited or moderately suited to grain crops and well suited to hay, pasture, and trees. The Luray and Westland soils are generally unsuited to buildings and septic tank absorption fields. The Ockley soils are well suited to buildings and well suited or moderately suited to septic tank absorption fields.

Seasonal wetness and ponding are the main limitations affecting cropland, woodland, and nonfarm uses, such as homesite development and septic tank absorption fields. The moderately slow permeability in the Luray soils and the slope and hazard of erosion in areas of the Ockley soils are additional management concerns. Maintaining tilth is a concern if the soils are worked when they are too wet.

13. Algiers-Luray-Mentor Association

Nearly level to moderately steep, somewhat poorly drained, very poorly drained, and well drained soils; on flood plains, lake plains, and terraces

This association is on broad flats interspersed with low rises, knolls, and side slopes. Slopes range from 0 to 18 percent.

This association makes up about 2 percent of the county. It is about 30 percent Algiers soils, 25 percent Luray soils, 10 percent Mentor soils, and 35 percent soils of minor extent.

Algiers soils are deep, nearly level, and somewhat poorly drained. They are on flood plains and are frequently flooded. Permeability is moderate. These soils have a seasonal high water table between depths of 12 and 24 inches during extended wet periods. They formed in recent alluvium over an older buried mineral soil. Typically, they have a surface layer of brown silt loam. The substratum is brown, mottled silt loam. Below the substratum is a buried surface layer of very dark gray silty clay loam. The subsoil is dark gray, mottled silty clay loam.

Luray soils are deep, nearly level, and very poorly drained. They are on flats and in swales on lake plains and terraces along streams. Permeability is moderately slow. These soils have a seasonal high water table near or above the surface and are subject to ponding after periods of heavy rain. They formed in lacustrine deposits. Typically, they have a surface layer of very dark gray silty clay loam. The subsurface layer is black silty clay loam. The subsoil is dark gray and dark grayish brown, mottled silty clay loam and silt loam.

Mentor soils are deep, nearly level to moderately steep, and well drained. They are on low rises, the higher flats, and side slopes on lake plains and terraces. Permeability is moderate. These soils formed in silty material. Typically, they have a surface layer of brown silt loam and a subsoil of yellowish brown silt loam.

Some of the minor soils in this association are Fitchville soils on slight rises, Sebring soils on flats, Ockley soils on slight rises and knolls on the higher terraces and on a few kames, and Wallkill soils on the lower flood plains. Fitchville soils have less sand in the subsoil than the Algiers soils, are better drained than the Luray soils, and are wetter than the Mentor soils. Sebring soils are poorly drained. Ockley soils have more sand and gravel in the substratum than the major soils. Wallkill soils have organic material in the lower part.

Most areas of this association are used as cropland. The nearly level and gently sloping soils are well suited to row crops, hay, and pasture. The sloping and moderately steep soils are poorly suited or moderately suited to cropland. All of the major soils are well suited to trees. The Algiers and Luray soils and the more sloping Mentor soils are poorly suited or generally unsuited to buildings and septic tank absorption fields, but the less sloping Mentor soils are well suited.

The main limitations affecting most uses are flooding and seasonal wetness in areas of the Algiers soils, the seasonal wetness, moderately slow permeability, and ponding in areas of the Luray soils, and the slope and hazard of erosion in areas of the Mentor soils. Maintaining tilth is a management concern if the soils are worked when they are too wet. Crop rotations that include grasses and legumes, grassed waterways, and a system of conservation tillage that leaves crop residue on the surface help to control erosion, minimize crusting, and improve tilth.

14. Glenford-Fitchville-Orrville Association

Nearly level and gently sloping, moderately well drained and somewhat poorly drained soils; on slack-water terraces, lake plains, and flood plains

This association is on broad flats and slight rises on flood plains, lake plains, and slack-water terraces. Slopes range from 0 to 6 percent.

This association makes up about 2 percent of the county. It is about 25 percent Glenford soils, 20 percent Fitchville soils, 15 percent Orrville soils, and 40 percent soils of minor extent.

Glenford soils are deep, nearly level and gently sloping, and moderately well drained. They are on terraces. Permeability is moderately slow. These soils have a seasonal high water table between depths of 24 and 42 inches during extended wet periods. They formed in silty lakebed sediment. Typically, they have a surface layer of brown silt loam. The upper part of the subsoil is yellowish brown silt loam, and the lower part is yellowish brown, mottled silt loam and silty clay loam.

Fitchville soils are deep, nearly level and gently sloping, and somewhat poorly drained. They are on terrace flats. Permeability is moderately slow. A seasonal high water table is between depths of 12 and 30 inches during extended wet periods. These soils formed in silty lakebed sediment. Typically, they have a surface layer of dark grayish brown silt loam. The subsoil is brown and yellowish brown, mottled silt loam and silty clay loam.

Orrville soils are deep, nearly level, and somewhat poorly drained. They are on flood plains and are occasionally flooded. Permeability is moderate. A seasonal high water table is between depths of 12 and 30 inches during extended wet periods. These soils formed in alluvium. Typically, they have a surface layer of dark grayish brown silt loam. The subsoil is dark gray, brown, and yellowish brown, mottled silt loam and loam.

Some of the minor soils in this association are the poorly drained Killbuck and Melvin and well drained Tioga soils on flood plains and the well drained Chili soils on terraces.

Most areas of this association are used as cropland. Some areas are used for hay and pasture or are wooded. The soils are well suited to row crops, hay, pasture, and woodland. The Glenford soils are moderately suited to most urban uses, but the Fitchville soils are poorly suited and the Orrville soils are generally unsuited.

The seasonal wetness of all the major soils and the hazard of flooding on the Orrville soils are the major management concerns. The hazard of erosion and moderately slow permeability in areas of the Glenford and Fitchville soils are additional concerns.

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 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, Amanda silt loam, 6 to 12 percent slopes, eroded, is a phase of the Amanda series.

Some map units are made up of two or more major soils. These map units are called soil complexes. 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. Rigley-Coshocton complex, 18 to 25 percent slopes, 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, gravel, 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.

Some soil boundaries and soil names in this survey do not fully match those in previously published surveys of adjoining counties. Most differences result from a better knowledge of soils or from modification and refinement of series concepts. Some differences result from variations in the dominance of different soils in map units consisting of soils of two or more series and from variations in the range in slope allowed in the map units in different surveys.

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

AfA—Alford silt loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on wide flats on Illinoian outwash terraces. Most areas are irregularly shaped and are 20 to 100 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 40 inches of strong brown, friable silt loam and firm silty clay loam. The substratum to a depth of about 60 inches is brown, friable silt loam. In places the slope is 2 to 4 percent. In a few areas the substratum is loam.

Included with this soil in mapping are small areas of somewhat poorly drained soils in slight depressions along natural drainageways or at the base of the

steeper slopes. These soils make up about 10 percent of most areas.

Permeability is moderate in the Alford soil. Available water capacity is high. Runoff is slow. Tilth is good. The root zone is deep.

Most areas are used for row crops, small grain, or hay. Some areas are used as pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. It warms and dries early in spring and thus is well suited to early spring tilling and planting. In tilled areas a surface crust forms after hard rains. Including grasses and legumes in the crop rotation, returning crop residue to the soil, and applying a system of conservation tillage that leaves crop residue on the surface minimize crusting.

This soil is well suited to pasture and hay. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Deferment of grazing during excessively wet periods minimizes compaction and helps to prevent damage to the pasture.

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

This soil is well suited to building site development and septic tank absorption fields, but a moderate shrink-swell potential is a limitation on sites for buildings. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Properly landscaping building sites and septic tank absorption fields results in good surface drainage.

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

AfB—Alford silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is mainly on low rises on wide Illinoian outwash terraces. It also is on the narrow, convex tops of ridges in the uplands. Most areas are irregularly shaped and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 40 inches of yellowish brown, friable silt loam and firm silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In places the slope is 0 to 2 percent or 6 to 9 percent. In a few areas the lower part of the subsoil or the substratum is loam or gravelly loam.

Included with this soil in mapping are small areas of Parke soils on slope breaks on outwash terraces, small areas of Cincinnati and Keene soils in the same positions on uplands as the Alford soil, and small areas of somewhat poorly drained soils in slight depressions. Parke soils contain more sand in the lower part than the Alford soil. Cincinnati soils have a fragipan. Keene soils are moderately well drained. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Alford soil. Available water capacity is high. Runoff is medium. Tilth is good. The root zone is deep.

Most areas are used as cropland or pasture. A few areas are wooded. Nursery stock is produced in a few areas.

This soil is well suited to corn, soybeans, and small grain. It warms and dries early in spring and thus is well suited to tilling and planting early in spring. The hazard of erosion is moderate if the soil is tilled. A surface crust forms in tilled areas after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including meadow crops in the crop rotation, and returning crop residue to the soil help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a moderate hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Deferment of grazing during excessively wet periods helps to keep the pasture in good condition.

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

This soil is well suited to building site development and septic tank absorption fields, but a moderate shrink-swell potential is a limitation on sites for buildings. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

AfC2—Alford silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on narrow ridgetops and on side slopes. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and convex and commonly are 150 to 450 feet long. Most areas are long and narrow and are 10 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 35 inches

thick. The upper part is yellowish brown, friable silt loam, and the lower part is strong brown, firm silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In places the slope is 12 to 18 percent. In a few areas the lower part of the subsoil or the substratum is loam or gravelly loam.

Included with this soil in mapping are small areas of Cincinnati and Keene soils. These soils are in the same landscape positions as the Alford soil. Cincinnati soils have a fragipan. Keene soils are moderately well drained. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Alford soil. Available water capacity is high. Runoff is rapid. Tilth is good. The root zone is deep.

Most areas are used for hay or pasture. Some areas are used for row crops, small grain, or woodland.

This soil is moderately suited to corn, small grain, and occasionally grown soybeans. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. Crop rotations that include hay and cover crops, contour stripcropping, grassed waterways, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and surface crusting. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. If properly managed, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. If the pasture is plowed during seedbed preparation or is overgrazed, however, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

Because of the slope and a moderate shrink-swell potential, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

AhB—Alford-Urban land complex, 2 to 6 percent slopes. This map unit consists of a deep, gently sloping, well drained Alford soil and areas of Urban land on Illinoian outwash terraces. Areas occur as long, narrow bands that are 10 to 50 acres in size. Most are about 45 percent Alford silt loam and 35 percent Urban land. The Alford soil and Urban land occur as areas so intricately mixed that separating them in mapping was not practical.

Typically, the Alford soil has a surface layer of brown, friable silt loam about 8 inches thick. The subsoil is about 40 inches of yellowish brown, friable silt loam and firm silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In places the soil has been altered radically. Some of the low areas have been filled or leveled during construction, and other small areas have been built up or smoothed.

The Urban land is covered by buildings and pavement. The buildings are mainly residential or commercial.

Included with the Alford soil and Urban land in mapping are some areas where the slope is 9 to 12 percent. Also included are narrow strips of Parke soils on slope breaks and along drainageways. These soils contain less silt in the lower part than the Alford soil. Included soils make up about 20 percent of most areas.

Permeability is moderate in the Alford soil. Available water capacity is high. Runoff is medium. Tilth is good. The root zone is deep.

The Alford soil is used for lawns, gardens, or parks. It is well suited to lawns, vegetable and flower gardens, trees, and shrubs. The included areas that have been cut and filled are not well suited to lawns and gardens. The exposed subsoil and substratum in these areas are sticky when wet and hard when dry and vary in reaction. Adding organic material to the soil improves tilth.

The Alford soil is well suited to building site development and septic tank absorption fields, but a moderate shrink-swell potential is a limitation on sites for buildings. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

The Alford soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

Ak—Algiers silt loam, frequently flooded. This deep, nearly level, somewhat poorly drained soil is on

flood plains. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 10 to more than 100 acres in size.

Typically, the upper 28 inches is recent alluvium, which is brown, friable silt loam. The alluvium is mottled below a depth of about 10 inches. It is underlain by a very poorly drained buried soil. The buried surface layer is very dark gray, mottled, friable silty clay loam about 16 inches thick. The buried subsoil to a depth of about 60 inches is dark gray, mottled, firm silty clay loam. In some areas the alluvium is less than 20 or more than 36 inches deep over the buried soil. In places the soil is poorly drained.

Included with this soil in mapping are small areas of the very poorly drained Sloan soils in depressions and high water channels. Also included are the somewhat poorly drained Shoals soils on narrow flood plains and in low areas on wide flood plains and the very poorly drained Luray soils along the edges of some mapped areas. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Algiers soil. Available water capacity is high. Runoff is very slow. The seasonal high water table is at a depth of 12 to 24 inches during extended wet periods. Tilth is good. In drained areas the root zone is deep.

Most areas are used for row crops. Some areas are used for hay or pasture. A few areas are wooded.

If drained, this soil is well suited to corn and soybeans. It generally is unsuited to small grain because of the flooding. The wetness and the flooding are the main limitations. Surface and subsurface drains commonly are used to lower the seasonal high water table in areas where suitable outlets are available. In tilled areas a surface crust forms after hard rains. Returning crop residue to the soil minimizes crusting. Tilling and harvesting at the optimum moisture content help to prevent excessive crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage. The forage species that can withstand some wetness should be selected for planting.

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

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

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

AmB2—Amanda silt loam, 2 to 6 percent slopes, eroded. This deep, gently sloping, well drained soil is on low knolls and ridges on Wisconsinan till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are dominantly 4 to 6 percent. Most areas are irregularly shaped and are 4 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 36 inches of yellowish brown, firm silty clay loam and clay loam. The substratum to a depth of about 60 inches is brown and yellowish brown, calcareous, firm loam glacial till. In some areas the slope is 6 to 9 percent. In other areas the soil is less eroded. In some places it is moderately well drained. In other places the substratum has pockets or lenses of sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Bennington soils on the more nearly level parts of the landscape. These soils make up about 10 percent of most areas.

Permeability is moderately slow in the Amanda soil. Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is at a depth of more than 48 inches during extended wet periods. Tilth is good. The root zone generally is deep, but in some areas it is restricted to the part of the profile above compact glacial till.

Most areas are used for row crops. Some areas are used for hay, pasture, or woodland.

This soil is well suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is moderate. A surface crust forms after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including grasses and legumes in the crop rotation, returning crop residue to the soil, and establishing grassed waterways help to control erosion and minimize crusting. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring, but compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate. No-till seeding helps to control erosion.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is well suited to building site development, but the slight seasonal wetness and a moderate shrink-swell potential are limitations. Installing drains at the

base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is moderately suited to septic tank absorption fields. The moderately slow permeability is a limitation. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

AmC2—Amanda silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on knolls and ridges and on dissected side slopes on Wisconsinan till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 400 feet long. Most areas are irregular in shape and are 4 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 39 inches of yellowish brown, firm silty clay loam and clay loam. The substratum to a depth of about 60 inches is dark yellowish brown, calcareous, firm loam glacial till. In some areas the soil is moderately well drained. In other areas the subsoil is thinner. In some places the slope is 12 to 18 percent. In other places the substratum has pockets or lenses of moderately permeable material. In a few areas the soil is less eroded.

Included with this soil in mapping are small areas of the somewhat poorly drained Shoals soils on narrow flood plains and small areas of severely eroded soils on the upper part of the slopes. The severely eroded soils have a surface layer of clay loam in which tilth is fair. They have a shallower root zone and a lower available water capacity than the Amanda soil. Included soils make up about 20 percent of most areas.

Permeability is moderately slow in the Amanda soil. Available water capacity is moderate. Runoff is rapid in cultivated areas. The seasonal high water table is at a depth of more than 48 inches during extended wet periods. Tilth is good. The root zone generally is deep, but in some areas it is restricted to the part of the profile above compact glacial till.

Many areas are used as cropland or pasture. Some areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain grown in rotation with meadow crops. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains, and the soil becomes cloddy if tilled when too wet. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations, contour stripcropping, and grassed waterways help to control erosion and minimize crusting. The soil is well suited to conservation tillage systems, including no-till farming. Tillage during optimum moisture conditions minimizes compaction.

This soil is well suited to pasture and hay. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. If the pasture is plowed during seedbed preparation or is overgrazed, however, erosion is a severe hazard. No-till seeding helps to control erosion. Deferment of grazing during excessively wet periods helps to keep the pasture in good condition.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, the slight seasonal wetness, the moderately slow permeability, and a moderate shrink-swell potential, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is well suited to ponds (fig. 7).

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

AmD2—Amanda silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil is mainly on dissected side slopes along drainageways and on some knolls on Wisconsinan till plains. In a few areas it is on kames. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 350 feet long. Most areas are long and narrow and are 4 to 25 acres in size. Some areas on knolls are oval.

Typically, the surface layer is brown, friable silt loam

Figure 7.—A pond in an area of Amanda silt loam, 6 to 12 percent slopes, eroded.

about 7 inches thick. The subsoil is about 34 inches of yellowish brown, firm silty clay loam, clay loam, and loam. The substratum to a depth of about 60 inches is dark yellowish brown, calcareous, firm loam glacial till. In some places the slope is 18 to 25 percent. In other places the subsoil is thinner. In some areas the soil is moderately well drained. In other areas the substratum has pockets or lenses of stratified gravelly loam to very gravelly loamy sand. In a few areas the surface layer is gravelly silt loam or gravelly loam.

Included with this soil in mapping are strips of the somewhat poorly drained Shoals soils on narrow flood plains, some seeps and springs, and small areas of severely eroded soils on the upper part of the slopes. The severely eroded soils have a surface layer of clay loam in which tilth is fair. They have a shallower root zone and a lower available water capacity than the Amanda soil. Inclusions make up about 20 percent of most areas.

Permeability is moderately slow in the Amanda soil. Available water capacity is moderate. Runoff is very rapid in cultivated areas. The seasonal high water table is at a depth of more than 48 inches during extended wet periods. Tilth is good. The root zone generally is deep, but in some areas it is restricted to the part of the profile above compact glacial till.

Most areas are used for hay, pasture, or woodland. Some areas are used for row crops or small grain.

This soil is poorly suited to row crops. In tilled areas the hazard of erosion is severe. Significant erosion has

occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, contour stripcropping, and grassed waterways help to control erosion and surface crusting. The good drainage favors no-till farming.

This soil is moderately suited to hay and pasture (fig. 8). If properly managed, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. No-till seeding also helps to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope and the moderately slow permeability, this soil is poorly suited to building site development and septic tank absorption fields. Designing buildings so that they conform to the natural slope of the land minimizes the need for cutting, filling, or land shaping. Enlarging the absorption area improves the capacity of septic tank absorption fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

AmE—Amanda silt loam, 18 to 25 percent slopes. This deep, steep, well drained soil is on dissected side slopes along drainageways and on a few knolls on Wisconsinan till plains. Slopes are smooth and commonly are 100 to 300 feet long. Most areas are long and narrow and are 4 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 37 inches of yellowish brown, firm clay loam and loam. The substratum to a depth of about 60 inches is brown, calcareous, firm loam glacial till. In some places the slope is 25 to 30 percent. In other places the subsoil is thinner. In some

Figure 8.—A pastured area of Amanda silt loam, 12 to 18 percent slopes, eroded.

areas the soil is moderately well drained or has pockets or lenses of moderately permeable material in the substratum.

Included with this soil in mapping are small areas of the somewhat poorly drained Shoals soils on narrow flood plains and small areas of severely eroded soils on the upper part of the slopes. The severely eroded soils have a surface layer of clay loam. They have a subsoil that is thinner than that of the Amanda soil. Also included are some springs and seeps. Inclusions make up about 20 percent of most areas.

Permeability is moderately slow in the Amanda soil. Available water capacity is moderate. Runoff is very rapid. The seasonal high water table is at a depth of more than 48 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are wooded. Some areas are used as pasture. A few areas are used as cropland.

This soil generally is unsuited to cultivated crops because of the slope and a very severe hazard of erosion. The slope limits the use of farming equipment.

Because of the slope, this soil is only moderately suited to pasture and is poorly suited to hay. If properly managed, it is well suited to grazing in winter and early in spring. If the pasture is tilled during reseeding, the hazard of erosion is very severe. No-till seeding helps to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope and the moderately slow permeability, this soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

AmF—Amanda silt loam, 25 to 50 percent slopes. This deep, very steep, well drained soil is on dissected side slopes along drainageways on Wisconsinan till plains. Slopes are smooth and commonly are 50 to 250 feet long. Most areas are long and narrow and are 2 to 25 acres in size.

Typically, the surface layer is very dark brown, friable silt loam about 2 inches thick. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 36 inches of yellowish brown, firm clay loam and loam. The substratum to a depth of about 60 inches is brown, calcareous, firm loam glacial till. In some areas the slope is 20 to 25 percent or more than 50 percent. In other areas the soil is moderately well drained. In some places the subsoil is thinner. In other places the substratum has pockets or lenses of moderately permeable material.

Included with this soil in mapping are small areas of the somewhat poorly drained Shoals soils on narrow flood plains and small areas of severely eroded soils on the upper part of the slopes. The severely eroded soils have a surface layer of clay loam. They have a subsoil that is thinner than that of the Amanda soil. Also included are some springs and seeps. Inclusions make up about 15 percent of most areas.

Permeability is moderately slow in the Amanda soil. Available water capacity is moderate. Runoff is very rapid. The seasonal high water table is at a depth of more than 48 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are wooded. A few areas are used as permanent pasture.

Because of the slope and a very severe hazard of erosion, this soil generally is unsuited to cultivated crops and hay and is poorly suited to pasture. The slope limits the use of most farm machinery. No-till seeding helps to control erosion in pastured areas.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope and the moderately slow permeability, this soil generally is unsuited to building site development and septic tank absorption fields.

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

AvC2—Amanda Variant silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on foot slopes at the base of the steeper hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 250 feet long. Most areas are long, narrow, and winding and are 15 to 35 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 46 inches thick. The upper part is strong brown, friable silt loam, and the lower part is yellowish brown, firm loam. The substratum to a depth of about 80 inches is yellowish brown, firm loam. In some areas the subsoil or substratum has a higher content of thin, flat stones. In

other areas the silty mantle is thicker. In places the soil is moderately well drained.

Included with this soil in mapping are small areas of soils in which the substratum has pockets or lenses of stratified fine sand to gravelly sand. These soils are in the same landscape positions as the Amanda Variant soil. Also included are small areas of Brownsville soils on the upper part of the foot slopes. These soils have a higher content of rock fragments throughout than the Amanda Variant soil. Also included are some small seeps and springs. Inclusions make up about 20 percent of most areas.

Permeability is moderate in the Amanda Variant soil. Available water capacity is high. Runoff is rapid. The root zone is deep.

Most areas are used as cropland or pasture. A few areas are wooded.

This soil is moderately suited to corn, small grain, and occasionally grown soybeans. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. Crop rotations that include meadow and cover crops, contour stripcropping, grassed waterways, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting. The soil is well suited to conservation tillage systems, including no-till farming.

This soil is well suited to hay and pasture. If properly managed, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. If the pasture is plowed during seedbed preparation or is overgrazed, however, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Overgrazing and grazing when the soil is too wet cause compaction, poor tilth, and a decreased rate of water infiltration.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, a moderate shrink-swell potential, and the moderate permeability, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent. Sloughing is a hazard in the included soils having a substratum that has pockets or lenses of sand or gravel. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

AvD2—Amanda Variant silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil is on foot slopes at the base of the steeper hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 150 to 250 feet long. Most areas are long, narrow, and winding and are 20 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 53 inches thick. The upper part is strong brown, brown, and yellowish brown, friable silt loam, and the lower part is yellowish brown, firm clay loam. The substratum to a depth of about 80 inches is yellowish brown, firm loam. In some areas the subsoil or substratum has a higher content of thin, flat stones. In other areas the soil is moderately well drained. In places the slope is 18 to 25 percent.

Included with this soil in mapping are small areas of soils in which the substratum has pockets or lenses of stratified fine sand to gravelly sand. These soils are in the same landscape positions as the Amanda Variant soil. Also included are small areas of Brownsville soils on the upper part of the foot slopes and some small seeps and springs. Brownsville soils have a higher content of rock fragments throughout than the Amanda Variant soil. Inclusions make up about 20 percent of most areas.

Permeability is moderate in the Amanda Variant soil. Available water capacity is high. Runoff is very rapid in cultivated areas. Tilth is good. The root zone is deep.

Most areas are used for hay or pasture. Some areas are wooded. A few areas are used for row crops or small grain.

This soil is poorly suited to row crops. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, a crop rotation that includes hay and cover crops, contour stripcropping, and grassed waterways help to control erosion and minimize crusting. The good drainage favors conservation tillage systems, including no-till farming.

This soil is moderately suited to hay and pasture. If properly managed, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. If the pasture is plowed during seedbed preparation or is overgrazed, however, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Overgrazing or grazing when the soil is too wet causes compaction and increases the hazard of erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, a moderate shrink-swell potential, and the moderate permeability, this soil is poorly suited to building site development and septic tank absorption fields. Designing buildings so that they conform to the natural slope of the land minimizes the need for cutting and filling. Backfilling along foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Sloughing is a hazard in the included soils in which the substratum has pockets or lenses of sand or gravel. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

BeA—Bennington silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on flats and low rises and in slight swales on Wisconsinan till plains. Most areas are irregularly shaped and are 5 to 50 acres in size. A few areas are more than 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 26 inches of yellowish brown, mottled, firm silty clay loam and clay loam. The substratum to a depth of about 60 inches is brown, mottled, calcareous, firm loam glacial till. In some areas the slope is 2 to 4 percent. In a few areas the soil is poorly drained. In places the subsoil has less clay.

Included with this soil in mapping are small areas of the moderately well drained Centerburg soils on low knolls and the very poorly drained Pewamo soils along drainageways and in closed depressions. Included soils make up about 20 percent of most areas.

Permeability is slow in the Bennington soil. Available water capacity is moderate. Runoff is slow. The seasonal high water table is perched at a depth of 12 to 30 inches during extended wet periods. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

Most areas are used as cropland or pasture. Some areas are wooded, especially if they are not drained.

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. It delays planting and limits the number of crops that can be grown. Surface drains commonly are used to remove excess surface water and provide outlets for subsurface drains. A subsurface drainage system commonly is used to lower the seasonal high water table. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The species that can withstand some wetness, such as alsike clover, 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 seasonal wetness and the slow permeability. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and septic tank absorption fields results in good surface drainage.

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

BeB—Bennington silt loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is on low knolls and rises on Wisconsinan till plains. Slopes commonly are 2 to 4 percent but range from 2 to 6 percent. Most areas are irregularly shaped and are 5 to 75 acres in size. A few areas are more than 100 acres in size.

Typically, the surface layer is dark grayish brown, very friable silt loam about 7 inches thick. The subsoil is about 27 inches thick. The upper part is yellowish brown, mottled, friable silt loam and firm and very firm

silty clay loam, and the lower part is yellowish brown and dark yellowish brown, mottled, very firm clay loam and firm loam. The substratum to a depth of about 80 inches is brown, mottled, calcareous, firm loam glacial till. In some areas the slope is 0 to 2 percent or 6 to 9 percent. In places the upper part of the subsoil is loam.

Included with this soil in mapping are small areas of the moderately well drained Centerburg soils on knolls and ridges and the very poorly drained Pewamo soils in depressions and along drainageways. Included soils make up about 20 percent of most areas.

Permeability is slow in the Bennington soil. Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 12 to 30 inches during extended wet periods. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

Most areas are used as cropland or pasture. Some areas are wooded, especially if they are not drained.

If drained, this soil is well suited to corn, soybeans, and small grain. The hazard of erosion and the seasonal wetness are the main management concerns. In tilled areas the hazard of erosion is moderate. Establishing grassed waterways, including meadow crops in the crop rotation, and returning crop residue to the soil help to control erosion. No-till farming or another system of conservation tillage that leaves crop residue on the surface also helps to control erosion in adequately drained areas. A drainage system helps to remove excess water. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate. No-till seeding helps to control erosion. The species that can withstand some wetness, such as alsike clover, 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 building site development and septic tank absorption fields because of the seasonal wetness and the slow permeability. The higher parts of knolls are the best building sites. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and septic tank absorption fields results in good surface drainage.

This soil is well suited to ponds (fig. 9).

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

BfA—Bennington-Urban land complex, 0 to 3 percent slopes. This map unit consists of a deep, nearly level, somewhat poorly drained Bennington soil and areas of Urban land on flats and low rises on Wisconsinan till plains. Areas commonly have straight boundaries with distinct corners and are 15 to 50 acres in size. Most are about 45 percent Bennington silt loam and 35 percent Urban land. The Bennington soil and Urban land occur as areas so intricately mixed or so small that separating them in mapping was not practical.

Typically, the Bennington soil has a surface layer of dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 26 inches of yellowish brown, mottled, firm silty clay loam and clay loam. The substratum to a depth of about 80 inches is brown, mottled, calcareous, firm loam glacial till. In places the soil has been altered radically. Some of the low areas have been filled or leveled during construction, and other small areas have been built up or smoothed.

The Urban land is covered by buildings and pavement. The buildings are mainly single-family houses or apartment buildings, but some are industrial or commercial.

Included with the Bennington soil and the Urban land in mapping are narrow strips of the very poorly drained Pewamo soils in depressions and along drainageways and small areas of the moderately well drained Centerburg soils on low knolls and ridges. Included soils make up about 20 percent of most areas.

Most areas have been drained by sewer systems, gutters, and subsurface drains. Undrained areas of the Bennington soil have a perched seasonal high water table at a depth of 12 to 30 inches during extended wet periods. Permeability is slow in this soil. Available water capacity is moderate. Runoff is slow. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

The Bennington soil is used for lawns or gardens. If drained, it is well suited to most vegetables, flowers, trees, and shrubs. Water-tolerant plants grow well in undrained areas. The perennial plants selected for planting in drained areas should be those that can withstand some wetness. The included spots that have been cut and filled are not well suited to lawns and gardens. In the exposed subsoil and substratum in

Figure 9.—A pond in an area of Bennington silt loam, 2 to 6 percent slopes.

these spots, tilth is very poor and reaction varies. The exposed material is sticky when wet and hard when dry. Adding organic material to the soil improves tilth.

The Bennington soil is poorly suited to building site development and septic tank absorption fields because of the seasonal wetness and the slow permeability. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent. In some areas sanitary facilities are connected to central sewage treatment facilities.

The Bennington soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

BgB—Berks channery silt loam, 2 to 6 percent slopes. This moderately steep, gently sloping, moderately deep, well drained soil is on narrow, unglaciated ridgetops. Most areas are irregularly shaped and are 5 to 15 acres in size. A few areas are long and narrow.

Typically, the surface layer is brown, friable channery silt loam about 7 inches thick. The subsoil is about 18 inches of yellowish brown, friable very channery and extremely channery silt loam. Thinly bedded, rippable, fine grained sandstone bedrock is at a depth of about 25 inches. In some areas the slope is 6 to 9 percent. In other areas the upper part of the soil has fewer coarse fragments.

Included with this soil in mapping are areas of the

deep Mechanicsburg soils and small areas of soils that have bedrock within a depth of 20 inches. These soils are in the same landscape positions as the Berks soil. They make up about 20 percent of most areas.

Permeability is moderate or moderately rapid in the Berks soil. Available water capacity is very low. Runoff is medium in cultivated areas. Tilth is good. The root zone generally is moderately deep. It commmonly is restricted to the part of the profile above the bedrock.

Most areas are used for hay or pasture. A few areas are used for row crops. Some areas are wooded.

This soil is moderately suited to corn and small grain. It dries and warms early in spring and thus is well suited to tilling and planting early in spring. The hazard of erosion and droughtiness are the main management concerns. No-till farming or another system of conservation tillage that leaves crop residue on the surface helps to control erosion and conserves moisture. The surface layer can be tilled throughout a fairly wide range of moisture conditions. Because of the moderate or moderately rapid permeability and the bedrock at a depth of 20 to 40 inches, small, frequent applications of a small amount of fertilizer and lime are more effective than one application of a large amount.

This soil is well suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. It dries and warms early in spring. Drought reduces forage production late in summer.

This soil is only moderately suited to trees because of the very low available water capacity. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

Because of the bedrock at a depth of 20 to 40 inches, this soil is only moderately suited to building site development and generally is unsuited to septic tank absorption fields. The bedrock commonly is rippable. The filtration of effluent is inadequate in septic tank absorption fields. Effluent that enters cracks in the underlying bedrock can move considerable distances and pollute ground water. Onsite investigation is necessary to determine the suitability of an alternative system. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

BgD—Berks channery silt loam, 12 to 18 percent slopes. This moderately deep, moderately steep, well drained soil is in narrow bands on unglaciated hillsides and on the higher parts of unglaciated ridgetops. Slopes are smooth and commonly are 100 to 200 feet long. Most areas on hillsides are long, narrow, and winding and range from 5 to 20 acres in size. Areas on ridgetops are oval and range from 3 to 15 acres in size.

Typically, the surface layer is brown, friable channery silt loam about 6 inches thick. The subsoil is about 18 inches of yellowish brown, friable very channery and extremely channery silt loam. Fine grained sandstone and shale bedrock is at a depth of about 24 inches. In some areas the slope is 9 to 12 percent. In other areas it is more than 18 percent.

Included with this soil in mapping are small areas of soils that have bedrock within a depth of 20 inches. These soils are in the same landscape positions as the Berks soil. They make up about 15 percent of most areas.

Permeability is moderate or moderately rapid in the Berks soil. Available water capacity is very low. Runoff is very rapid. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the bedrock.

Most areas are used for hay or pasture. Some areas are wooded. A few areas are used as cropland.

Because of the hazard of erosion, the slope, and droughtiness, this soil is poorly suited to corn and small grain. In tilled areas the hazard of erosion is very severe. The soil dries and warms early in spring and thus is well suited to tilling and planting early in spring. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, and contour stripcropping conserve moisture and help to control erosion. Grassed waterways also help to control erosion. Because of the moderate or moderately rapid permeability and the bedrock at a depth of 20 to 40 inches, frequent applications of a small amount of fertilizer are more effective than one application of a large amount.

This soil is moderately suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a very severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

Because of the very low available water capacity, this soil is only moderately suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment. Mulching and planting seedlings that have been transplanted once reduce the seedling mortality rate.

Because of the slope and the bedrock at a depth of 20 to 40 inches, this soil is poorly suited to building site development and generally is unsuited to septic tank

absorption fields. Buildings should be designed so that they conform to the natural slope of the land. The bedrock commonly is rippable. The filtration of effluent is inadequate in septic tank absorption fields. Onsite investigation is necessary to determine the suitability of an alternative system. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

BrC—Brownsville channery silt loam, 6 to 12 percent slopes. This deep, sloping, well drained soil is on unglaciated ridgetops and knolls. Slopes are smooth and commonly are 150 to 300 feet long. Most areas are long and narrow and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable channery silt loam about 7 inches thick. The subsoil is about 35 inches of yellowish brown, friable channery and very channery silt loam. The substratum is yellowish brown, friable very channery silt loam. Thinly bedded siltstone and fine grained sandstone bedrock is at a depth of about 47 inches. In some places, the soil is eroded and the surface layer is very channery silt loam or is stony. In other places the slope is 2 to 6 percent or 12 to 18 percent. In some areas the subsoil or substratum is very channery fine sandy loam. In other areas the surface layer and the upper part of the subsoil have fewer stones. In a few areas the soil is moderately deep over bedrock.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils. These soils are higher on the landscape than the Brownsville soil. Also included are small areas of Mechanicsburg soils, which are in the same landscape positions as the Brownsville soil or are in the lower positions. Mechanicsburg soils have a lower content of rock fragments in the subsoil than the Brownsville soil. Included soils make up about 20 percent of most areas.

Permeability is moderate or moderately rapid in the Brownsville soil. Available water capacity is low. Tilth is good. Runoff is rapid in cultivated areas. The root zone is deep.

Most areas are used as hayland, pasture, or woodland or are covered with brush. Some areas are used for row crops or small grain.

This soil is moderately suited to corn and small grain. In tilled areas the hazard of erosion is severe. The soil dries and warms early in spring and thus is suited to tilling and planting early in spring. It is well suited to conservation tillage systems, including no-till farming. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, and contour stripcropping help to control erosion and conserve moisture. Grassed waterways also help to control erosion. Because of the moderate or moderately rapid permeability, frequent applications of a small amount of fertilizer are more effective than one application of a large amount.

This soil is well suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. No-till seeding helps to control erosion and conserves moisture.

Because of the low available water capacity, this soil is only moderately suited to trees. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once. Building logging roads and skid trails on the contour facilitates the use of equipment.

This soil is only moderately suited to building site development because of the slope and the high content of thin, flat stones. Buildings should be designed so that they conform to the natural slope of the land. Most of the stones are small and can be excavated by conventional equipment. The underlying bedrock commonly is rippable. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

Depending on the depth to bedrock, this soil is poorly suited or moderately suited to septic tank absorption fields. Where the bedrock is near a depth of 40 inches, the filtration of effluent is inadequate in the absorption fields. Effluent that enters cracks in the underlying bedrock can move considerable distances and pollute ground water. In areas where it is sufficiently deep for adequate filtration, the soil is moderately suited to septic tank absorption fields. Onsite investigation can determine the depth to bedrock. Installing the distribution lines on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

BrD—Brownsville channery silt loam, 12 to 18 percent slopes. This deep, moderately steep, well drained soil is mainly on unglaciated hillsides. In a few areas it is on knolls and ridgetops. Slopes are smooth and commonly are 150 to 400 feet long. Most areas on hillsides are long and winding and are 10 to 60 acres in size. Areas on knolls commonly are oval and are 6 to 30 acres in size.

Typically, the surface layer is brown, friable channery silt loam about 7 inches thick. The subsoil is about 33

inches of yellowish brown, friable channery and very channery silt loam. The substratum is yellowish brown, friable very channery silt loam. Thinly bedded siltstone and fine grained sandstone bedrock is at a depth of about 50 inches. In some places the slope is 18 to 25 percent or 6 to 12 percent. In other places, the soil is eroded and the surface layer is very channery silt loam or is stony. In some areas the subsoil or substratum is very channery fine sandy loam. In other areas the surface layer and the upper part of the subsoil have fewer stones. In a few areas the soil is moderately deep over bedrock.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils on the upper part of some hillsides and small areas of Mechanicsburg soils. Mechanicsburg soils have a lower content of rock 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 25 percent of most areas.

Permeability is moderate or moderately rapid in the Brownsville soil. Available water capacity is low. Runoff is very rapid in cultivated areas. Tilth is good. The root zone is deep.

Most areas are used as hayland, pasture, or woodland or are covered with brush. Some areas are used for row crops or small grain.

Because of the hazard of erosion, the slope, and droughtiness, this soil is poorly suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is severe. The soil dries and warms early in spring and thus is suited to tilling and planting early in spring. It is well suited to conservation tillage systems, including no-till farming. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, and contour stripcropping help to control erosion and conserve moisture. Grassed waterways also help to control erosion. Because of the moderate or moderately rapid permeability, frequent applications of a small amount of fertilizer are more effective than one application of a large amount.

This soil is moderately suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. No-till seeding helps to control erosion and conserves moisture.

Because of the low available water capacity, this soil is only moderately suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

Because of the slope, this soil is poorly suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. The underlying bedrock commonly is rippable. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to bedrock. Where the bedrock is closest to the surface, the filtration of effluent is inadequate in the absorption fields. Effluent that enters cracks in the underlying bedrock can move considerable distances and pollute ground water. In areas where the soil is sufficiently deep for adequate filtration, enlarging the absorption area and installing the distribution lines on the contour improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. Onsite investigation can determine the depth to bedrock.

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

BrE—Brownsville channery silt loam, 18 to 25 percent slopes. This deep, steep, well drained soil is mainly on unglaciated hillsides. Slopes are smooth and commonly are 150 to 800 feet long. Most areas are long and winding and are 20 to more than 200 acres in size. Some are oval and are 6 to 20 acres in size.

Typically, the surface layer is very dark grayish brown, friable channery silt loam about 2 inches thick. The subsurface layer is brown, friable channery silt loam about 4 inches thick. The subsoil is about 35 inches of yellowish brown, friable channery silt loam and very channery loam. The substratum is yellowish brown, mottled, friable very channery silt loam. Fractured siltstone bedrock is at a depth of about 51 inches. In some areas the slope is 25 to 35 percent. In other areas the subsoil or substratum is very channery fine sandy loam. In some places, the soil is eroded and the surface layer is very channery silt loam or is stony. In other places the soil is moderately deep.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils on the upper part of some hillsides and the moderately well drained Clarksburg soils on some foot slopes. Also included are small areas of Mechanicsburg soils, narrow strips of the somewhat poorly drained Orrville soils on flood plains, and oval areas on hilltops where the slope is 6 to 12 percent. Mechanicsburg soils are in the same landscape positions as the Brownsville soil. They have a lower content of rock fragments in the subsoil than the Brownsville soil. Included soils make

up about 20 percent of most areas.

Permeability is moderate or moderately rapid in the Brownsville soil. Available water capacity is low. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are used as pasture or woodland or are covered with brush. Only a few areas are used as cropland.

This soil is poorly suited to cultivated crops because of the slope, droughtiness, and a severe hazard of erosion. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, and contour stripcropping help to control erosion and conserve moisture. Grassed waterways also help to control erosion. Because of the moderate or moderately rapid permeability, frequent applications of a small amount of fertilizer are more effective than one application of a large amount.

Because of the slope, this soil is only moderately suited to pasture and is poorly suited to hay. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. No-till seeding helps to control erosion and conserves moisture.

Because of the low available water capacity, this soil is only moderately suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

Erosion is a hazard on access roads to oil and gas wells in areas of this soil. It can be controlled by constructing the roads across the slope, mulching, reseeding, and establishing water bars.

This soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields because of the slope. Buildings should be designed so that they conform to the natural slope of the land. The underlying bedrock commonly is rippable. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

BrF—Brownsville channery silt loam, 25 to 35 percent slopes. This deep, very steep, well drained soil generally is on unglaciated hillsides. In some areas it is on all parts of small hills. Slopes are smooth and commonly are 150 to 400 feet long. In places they are dissected by small drainageways. Most areas on hillsides are long and winding and are 30 to 150 acres in size. Areas on small hills are oval and range from 5 to 10 acres in size.

Typically, the surface layer is very dark grayish brown, friable channery silt loam about 4 inches thick. The subsurface layer is brown, friable channery silt loam about 4 inches thick. The subsoil is about 32 inches of yellowish brown, friable very channery and extremely channery loam. The substratum is yellowish brown, friable extremely channery loam. Thinly bedded, fractured siltstone bedrock is at a depth of about 50 inches. In some areas the slope is 18 to 25 percent. In other areas the subsoil or substratum is very channery fine sandy loam. In places the surface layer is stony. In a few areas the soil is moderately deep.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils on the upper part of some hillsides and small areas of the moderately well drained Clarksburg soils on some foot slopes. Also included are narrow strips of the somewhat poorly drained Orrville soils on flood plains and some areas on hilltops where the slope is 6 to 12 percent. Included soils make up about 20 percent of most areas.

Permeability is moderate or moderately rapid in the Brownsville soil. Available water capacity is low. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are wooded. Some areas are used as permanent pasture.

Because of the slope, droughtiness, and a very severe hazard of erosion, this soil generally is unsuited to cultivated crops and is poorly suited to permanent pasture. It generally is too steep for intensive pasture management. Because of the good drainage, it is well suited to grazing in winter and early in spring. Drought retards the growth of forage species during dry periods. Erosion is a very severe hazard unless an adequate plant cover is maintained. No-till seeding conserves moisture and helps to control erosion.

Because of the low available water capacity, this soil is only moderately suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

Erosion is a hazard on access roads to oil and gas wells in areas of this soil. It can be controlled by constructing the roads across the slope, mulching, reseeding, and establishing water bars.

This soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields because of the slope. Buildings should be designed so that they conform to the natural slope of the land. The underlying bedrock commonly is rippable. The hazards of runoff and erosion can be reduced by maintaining a

plant cover where possible on the construction site.

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

BrG—Brownsville channery silt loam, 35 to 70 percent slopes. This deep, very steep, well drained soil is on unglaciated hillsides. Slopes are smooth and commonly are 200 to 400 feet long. Most areas are long and winding and are 8 to 40 acres in size. A few areas are more than 100 acres in size.

Typically, the surface layer is dark grayish brown, friable channery silt loam about 3 inches thick. The subsurface layer is brown, friable channery silt loam about 5 inches thick. The subsoil is about 18 inches of yellowish brown, friable very channery and extremely channery silt loam. The substratum is yellowish brown, friable extremely channery loam. Thinly bedded, fractured siltstone bedrock is at a depth of about 64 inches. In some areas the slope is 30 to 35 percent. In a few areas it is more than 70 percent. In some places the soil is moderately deep. In a few places the surface layer is stony. In some areas the subsoil and substratum have more sand.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils on the upper part of some hillsides. These soils make up about 15 percent of most areas.

Permeability is moderate or moderately rapid in the Brownsville soil. Available water capacity is low. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are wooded. This soil generally is unsuited to cultivated crops, hay, and pasture. Because of the low available water capacity and the slope, it is only moderately suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

This soil generally is unsuited to building site development and septic tank absorption fields because of the slope.

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

Ca—Carlisle muck. This deep, nearly level, very poorly drained soil is in depressions on Wisconsinan till plains, outwash terraces, and lake plains. It receives runoff from the higher adjacent soils and is subject to ponding in fall, winter, and spring. Slopes are 0 to 2 percent. Most areas are oval or irregularly shaped and are 2 to 90 acres in size.

Typically, the surface layer is black, very friable muck about 10 inches thick. Below this to a depth of about 60 inches is dark reddish brown, very friable muck. In some areas the surface layer is recent alluvium of silt loam. In other areas a layer of loamy material is at a depth of more than 40 inches.

Included with this soil in mapping are small areas of the very poorly drained Wallkill soils along the edges of flood plains, small areas of Luray soils along the edges of some depressions, and a few areas of soils that have clayey material within a depth of 40 inches. The upper part of the Wallkill soils is alluvium. Luray soils formed in mineral material. Included soils make up about 20 percent of most areas.

Permeability is moderately slow to moderately rapid in the Carlisle soil. Available water capacity is very high. Runoff is very slow or ponded. Unless the soil is drained, the seasonal high water table is near or above the surface for long periods. It restricts the root zone. Tilth is good. Strength is low, and compressibility is high.

Most areas are used as cropland. Some areas are used as pasture. Undrained areas commonly are wooded or are used as habitat for wetland wildlife.

If drained, this soil is moderately suited to corn and soybeans. It is poorly suited to small grain because of the ponding. Undrained areas are too wet for cultivated crops. Frost is a hazard because of the low position on the landscape. Because the soil is soft and highly compressible, especially when wet, it commonly cannot support narrow-wheeled equipment. Surface and subsurface drains can remove excess water, but subsurface drains can shift out of alignment over time and iron deposits can plug them. In some areas establishing suitable drainage outlets is difficult. The banks of open ditches commonly are unstable and subject to sloughing, and the soil subsides and shrinks after it is drained. During dry periods, fire and soil blowing are hazards. Controlled drainage in areas where the water table can be raised or lowered minimizes subsidence, helps to prevent fires, and helps to control erosion.

This soil is moderately suited to pasture. It is well suited to grasses that can withstand wetness, such as reed canarygrass. Because of the very high available water capacity, forage species generally grow well during long dry periods. Grazing when the soil is wet can cause considerable damage to the pasture.

Because of the prolonged wetness, this soil is only moderately suited to the trees that can withstand wetness. Undrained areas are well suited to habitat for wetland wildlife and support water-tolerant trees, cattails, reeds, and sedges. The species that can withstand wetness should be selected for planting.

Planting seedlings that have been transplanted once minimizes the seedling mortality rate. Harvesting methods that do not isolate the remaining trees or leave them widely spaced help to control windthrow. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Logging when the soil is frozen or during the drier parts of the year minimizes compaction and the formation of ruts and facilitates the use of equipment.

This soil generally is unsuited to building site development and septic tank absorption fields because of the ponding, subsidence, low strength, and the moderately slow to moderately rapid permeability.

This soil is a potential source of peat.

The land capability classification is IIIw. The woodland ordination symbol is 6W.

CeB—Centerburg silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on low knolls and ridges on Wisconsinan till plains. Areas commonly are irregularly shaped and are 5 to 20 acres in size. A few areas are 20 to 30 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown and dark yellowish brown, mottled, firm clay loam. The substratum to a depth of about 80 inches is brown, mottled, firm, calcareous loam glacial till. In some areas the slope is 6 to 12 percent. In other areas the lower part of the subsoil is silt loam. In places the soil is eroded.

Included with this soil in mapping are the very poorly drained Pewamo soils in depressions and the somewhat poorly drained Bennington soils near the base of some slopes and in the more nearly level areas. Included soils make up about 15 percent of most areas.

Permeability is moderately slow in the Centerburg soil. Available water capacity is moderate. Runoff is medium in cultivated areas. Tilth is good. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is well suited to corn, soybeans, and small grain. Erosion is a moderate hazard. A surface crust forms in tilled areas after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including meadow crops in the crop rotation, and returning crop residue to the soil help to control erosion and minimize crusting (fig. 10). Grassed waterways also help to control erosion.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate. No-till seeding helps to control erosion.

This soil is well suited to trees. If good management is applied, seedlings grow well. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is moderately suited to building site development. The seasonal wetness and a moderate shrink-swell potential in the subsoil are limitations, especially on sites for buildings with basements. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. The highest landscape positions should be selected for building site development. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is moderately suited to septic tank absorption fields. The seasonal wetness and the moderately slow permeability are severe limitations. Perimeter drains around the absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage.

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

CeC2—Centerburg silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on knolls, ridges, and dissected side slopes along drainageways on Wisconsinan till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 400 feet long. Most areas are irregularly shaped and are 5 to 30 acres in size. Some areas are as large as 75 acres.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 24 inches thick. The upper part is yellowish brown, firm silty clay loam, and the lower part is dark yellowish brown,

Figure 10.—Soybeans planted in corn stubble in an area of Centerburg silt loam, 2 to 6 percent slopes.

mottled, firm silty clay loam and clay loam. The substratum to a depth of about 60 inches is dark yellowish brown, mottled, calcareous, firm loam glacial till. In places the soil is well drained. In a few areas the slope is 2 to 6 percent or 12 to 15 percent. In some areas the soil is less eroded.

Included with this soil in mapping are small areas of severely eroded soils on the upper part of the slopes, small areas of the somewhat poorly drained Bennington soils in low spots and near the base of knolls, narrow strips of the very poorly drained Pewamo soils along drainageways, and strips of the somewhat poorly drained Shoals soils on narrow flood plains. The severely eroded soils have a surface layer of gravelly clay loam in which tilth is fair. Also included are some springs and seeps. Inclusions make up about 20 percent of most areas.

Permeability is moderately slow in the Centerburg soil. Available water capacity is moderate. Runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

Many areas are used as cropland or pasture. Some areas are wooded.

This soil is moderately suited to corn, small grain, and occasionally grown soybeans. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, and contour stripcropping minimize crusting and help to control erosion. Grassed waterways also help to control erosion.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. No-till seeding helps to control erosion.

This soil is well suited to trees. Plant competition can

be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, the seasonal wetness, the moderately slow permeability, and a moderate shrink-swell potential in the subsoil, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields and interceptor drains upslope from the absorption fields help to prevent lateral seepage and lower the seasonal high water table. Installing the distribution lines on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

CfB—Centerburg-Urban land complex, 2 to 6 percent slopes. This map unit consists of a deep, gently sloping, moderately well drained Centerburg soil and areas of Urban land on low knolls and ridges on Wisconsinan till plains. Areas commonly have straight boundaries with distinct corners and are 20 to 50 acres in size. Most are about 45 percent Centerburg silt loam and 35 percent Urban land. The Centerburg soil and Urban land occur as areas so intricately mixed or so small that separating them in mapping was not practical.

Typically, the Centerburg soil has a surface layer of brown, friable silt loam about 7 inches thick. The subsoil is about 28 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown and dark yellowish brown, mottled, firm clay loam. The substratum to a depth of about 80 inches is brown, mottled, calcareous, firm loam glacial till. In some areas the slope is 6 to 12 percent. In other areas the soil has been radically altered by cutting and filling.

The Urban land is covered by buildings and pavement. The buildings are mainly residential, but some are industrial or commercial.

Included with the Centerburg soil and Urban land in mapping are small areas of the somewhat poorly drained Bennington soils on flats and slight rises and small areas of the very poorly drained Pewamo soils in depressions. Included soils make up about 20 percent of most areas.

Most areas have been drained by sewer systems, gutters, and drains. Undrained areas of the Centerburg soil have a perched seasonal high water table at a depth of 18 to 36 inches during extended wet periods. Permeability is moderately slow in this soil. Available water capacity is moderate. Runoff is medium. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

The Centerburg soil is used for lawns, gardens, or parks. It is well suited to gardens, lawns, shrubs, and trees. The spots that have been cut and filled are not well suited to lawns and gardens. In areas where the subsoil and substratum are exposed, tilth is very poor and reaction varies. The exposed material is sticky when wet and hard when dry. Adding organic material to the soil improves tilth.

Because of the seasonal wetness, a moderate shrink-swell potential in the subsoil, and the moderately slow permeability, the Centerburg soil is only moderately suited to dwellings and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundation walls with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. In some areas sanitary facilities are connected to sewers and sewage treatment facilities. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

The Centerburg soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

CfC—Centerburg-Urban land complex, 6 to 12 percent slopes. This map unit consists of a deep, sloping, moderately well drained Centerburg soil and areas of Urban land on Wisconsinan till plains. Areas are irregularly shaped but commonly have some straight boundaries. Most are 10 to 40 acres in size, but some are larger than 100 acres. Most areas are about 45 percent Centerburg silt loam and 35 percent Urban land. The Centerburg soil and Urban land occur as areas so intricately mixed or so small that separating

them in mapping was not practical.

Typically, the Centerburg soil has a surface layer of brown, friable silt loam about 6 inches thick. The subsoil is about 24 inches thick. The upper part is yellowish brown, firm silty clay loam, and the lower part is dark yellowish brown, mottled, firm silty clay loam and clay loam. The substratum to a depth of about 60 inches is dark yellowish brown, mottled, calcareous, firm loam glacial till. In some areas the slope is 4 to 6 percent. In a few areas along drainageways, it is 12 to 18 percent. In places the soil has been radically 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 and pavement. The buildings are mainly residential, but some are industrial or commercial.

Included with the Centerburg soil and Urban land in mapping are small areas of the somewhat poorly drained Bennington soils on the lower part of the slopes and on low knolls and narrow strips of the very poorly drained Pewamo soils in depressions. Included soils make up about 20 percent of most areas.

Most areas have been drained by sewer systems, gutters, and drains. Undrained areas of the Centerburg soil have a perched seasonal high water table at a depth of l8 to 36 inches during extended wet periods. Permeability is moderately slow in this soil. Available water capacity is moderate. Runoff is rapid. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact substratum.

The Centerburg soil is used for lawns, gardens, or parks. It is well suited to gardens, lawns, shrubs, and trees. The spots that have been cut and filled are not well suited to lawns and gardens. In areas where the subsoil and substratum are exposed, tilth is very poor and reaction varies. The exposed material is sticky when wet and hard when dry. Adding organic material to the soil improves tilth.

Because of the seasonal wetness, a moderate shrink-swell potential, the moderately slow permeability, and the slope, the Centerburg soil is only moderately suited to dwellings and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundation walls with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. In some areas sanitary facilities are connected to sewers and sewage treatment facilities. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface.

The Centerburg soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

ChA—Chili loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on flats on Wisconsinan outwash terraces. Most areas are irregularly shaped and are 10 to 100 acres in size.

Typically, the surface layer is brown, friable loam about 10 inches thick. The subsoil is about 45 inches thick. The upper part is yellowish brown, friable loam, and the lower part is brown and strong brown, friable gravelly sandy clay loam and gravelly sandy loam. The substratum to a depth of about 60 inches is yellowish brown, loose gravelly loamy sand. In some areas the slope is 2 to 4 percent. In a few areas the surface layer and the lower part of the subsoil are silt loam.

Included with this soil in mapping are small areas of somewhat poorly drained soils in depressions. Also included, in the same landscape positions as the Chili soil, are soils in which the substratum is gravelly sandy loam. Included soils make up about 15 percent of most areas.

Permeability is moderately rapid in the Chili soil. Available water capacity is low or moderate. Runoff is slow. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used as hayland or pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. Either conventional tillage or conservation tillage can be used. Drought is a hazard during periods of low rainfall. No-till farming or another system of conservation tillage that leaves crop residue on the surface conserves moisture. The soil dries and warms early in spring and thus is well suited to tilling and planting early in spring. Frequent applications of a small amount of fertilizer minimize the loss of plant nutrients through leaching. The soil is suited to irrigation.

This soil is well suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. Deep-rooted plants, such as alfalfa, can withstand drought better than shallow-rooted plants.

Because of the suitability for cropland, only a few areas are wooded. This soil is well suited to trees. No

major hazards or limitations affect planting or harvesting.

This soil is well suited to building site development and septic tank absorption fields. The slope, the moderately rapid permeability, and the good natural drainage favor these uses. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Sloughing is a hazard if the soil is excavated.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys. The included areas where the substratum is gravelly sandy loam are not probable sources.

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

ChB—Chili loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on low knolls on Wisconsinan outwash terraces. Most areas are irregularly shaped and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable loam about 9 inches thick. The subsoil is about 46 inches thick. The upper part is yellowish brown, friable loam, and the lower part is brown, friable gravelly sandy clay loam and gravelly sandy loam. The substratum to a depth of about 60 inches is yellowish brown, loose gravelly loamy sand. In some areas the slope is 0 to 2 percent or 6 to 9 percent. In a few areas the surface layer and the lower part of the subsoil are silt loam.

Included with this soil in mapping are small areas of somewhat poorly drained soils in slight depressions. Also included are soils that are gravelly sandy loam in the lower part. These soils are in the same landscape positions as the Chili soil. Included soils make up about 15 percent of most areas.

Permeability is moderately rapid in the Chili soil. Available water capacity is low or moderate. Runoff is medium. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. A moderate hazard of erosion and slight droughtiness are management concerns. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including hay and cover crops in the crop rotation, and returning crop residue to the soil help to control erosion and conserve moisture. The soil dries and warms early in spring and thus is suited to tilling and planting early in spring. Frequent applications of a small amount of fertilizer minimize the loss of plant nutrients through leaching. The soil is suited to irrigation, but controlling erosion is a management concern in irrigated areas.

This soil is well suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. Deep-rooted plants, such as alfalfa, can withstand drought better than shallow-rooted plants. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a moderate hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

Because of the suitability for cropland, only a few areas are wooded. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is well suited to building site development and septic tank absorption fields. Sloughing is a hazard if the soil is excavated.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys. The included areas where the substratum is gravelly sandy loam are not probable sources.

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

ChC2—Chili loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on slope breaks on Wisconsinan outwash terraces and on knolls on kames. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 60 to 250 feet long. Those on kames commonly are 60 to 200 feet long. Most areas on outwash terraces are long, winding, and narrow and are 3 to 30 acres in size. Areas on kames commonly are oval and are 5 to 20 acres in size.

Typically, the surface layer is brown, friable loam about 6 inches thick. The subsoil is about 44 inches thick. It is yellowish brown and friable loam. The upper part is loam and gravelly loam, and the lower part is gravelly sandy loam. The substratum to a depth of about 60 inches is strong brown, loose gravelly loamy sand. In some areas the slope is 4 to 6 percent or 12 to 15 percent.

Included with this soil in mapping are small areas of soils that are gravelly sandy loam in the lower part and small areas of soils that are droughtier than the Chili soil and contain more sand in the surface layer and subsoil. These soils are in the same landscape positions as the Chili soil. Also included are small areas of severely eroded soils that have more gravel in the surface layer than the Chili soil. In these soils, tilth is poor and the available water capacity is lower than that

of the Chili soil. Included soils make up about 15 percent of most areas.

Permeability is moderately rapid in the Chili soil. Available water capacity is low or moderate. Runoff is rapid. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used as pasture, hayland, or woodland.

This soil is moderately suited to corn, soybeans, and small grain grown in rotation with meadow crops. Erosion and slight droughtiness are management concerns. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including hay and cover crops in the crop rotation, and returning crop residue to the soil help to control erosion and conserve moisture. The soil dries and warms early in spring and thus is suited to tilling and planting early in spring. Frequent applications of a small amount of fertilizer minimize the loss of plant nutrients through leaching.

This soil is well suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. Deep-rooted plants, such as alfalfa, can withstand drought better than shallow-rooted plants. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

Because of the slope, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Sloughing is a hazard if the soil is excavated. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys. The depth to usable layers, the thickness of those layers, and the gradation of individual grain sizes vary, especially in areas on kames. The included areas where the substratum is gravelly sandy loam are not probable sources.

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

ChD2—Chili loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil generally is on slope breaks on Wisconsinan outwash terraces. In a few areas it is on knolls on kames. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 60 to 200 feet long. Those on kames commonly are 60 to 250 feet long. Most areas on outwash terraces are long, narrow, and winding and are 4 to 15 acres in size. Areas on kames commonly are oval and are 5 to 20 acres in size.

Typically, the surface layer is brown, friable loam about 5 inches thick. The subsoil is about 45 inches thick. It is yellowish brown and friable. The upper part is loam and gravelly loam, and the lower part is gravelly sandy loam. The substratum to a depth of about 60 inches is yellowish brown, loose gravelly loamy sand. In some areas the slope is 9 to 12 percent or 18 to 25 percent.

Included with this soil in mapping are small areas of soils that are gravelly sandy loam in the lower part and small areas of soils that are droughtier than the Chili soil and contain more sand in the surface layer and subsoil. These soils are in the same landscape positions as the Chili soil. Also included, on the upper part of the slopes, are small areas of severely eroded soils that have more gravel in the surface layer than the Chili soil. In these soils, tilth is poor and the available water capacity is lower than that in the Chili soil. Included soils make up about 15 percent of most areas.

Permeability is moderately rapid in the Chili soil. Available water capacity is low or moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are used as pasture or hayland. Some areas are used for row crops or are wooded.

This soil is poorly suited to row crops. Erosion and drought are management concerns. In tilled areas the hazard of erosion is very severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include long-term hay or pasture, cover crops, and grassed waterways help to control erosion and conserve moisture. Frequent applications of a small amount of fertilizer minimize the loss of plant nutrients through leaching.

This soil is moderately suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Drought reduces yields of hay late in the growing season. Deep-rooted plants, such as alfalfa, can withstand drought better than shallow-rooted

plants. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion.

Because of the slope, this soil is poorly suited to building site development and septic tank absorption fields. Designing buildings so that they conform to the natural slope of the land minimizes the need for cutting, filling, or land shaping. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Sloughing is a hazard if the soil is excavated. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys. The depth to usable layers, the thickness of those layers, and the gradation of individual grain sizes vary, especially in areas on kames. The included areas where the substratum is gravelly sandy loam are not probable sources.

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

ChE2—Chili loam, 18 to 25 percent slopes, eroded. This deep, steep, well drained soil is on slope breaks on Wisconsinan outwash terraces. Erosion has removed part of the original surface layer. The present surface layer is a mixture of the original surface layer and some subsoil material. Slopes are smooth and commonly are 60 to 150 feet long. Most areas are long and narrow and are 4 to 15 acres in size.

Typically, the surface layer is brown, friable loam about 4 inches thick. The subsoil is about 55 inches thick. It is yellowish brown and friable. The upper part is gravelly loam, and the lower part is gravelly sandy loam. The substratum to a depth of about 60 inches is yellowish brown, friable gravelly loamy sand. In some areas the slope is 12 to 18 percent or 26 to 30 percent.

Included with this soil in mapping are small areas of severely eroded soils. In these soils tilth is poor, the available water capacity is lower than that in the Chili soil, and the surface layer contains more gravel. These soils are in the same landscape positions as the Chili soil. Also included are some seeps and springs on the lower part of the slopes. Inclusions make up about 15 percent of most areas.

Permeability is moderately rapid in the Chili soil. Available water capacity is low or moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are wooded or covered with brush. Some areas are used as pasture. A few areas in the dominantly flatter fields are used as cropland.

Because of the slope, a very severe hazard of erosion, and droughtiness, this soil is poorly suited to row crops. A permanent cover of sod or trees helps to control erosion.

Because of the slope and the very severe hazard of erosion, this soil is only moderately suited to pasture and is poorly suited to hay. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. Drought restricts plant growth during dry periods. Deep-rooted plants, such as alfalfa, grow better during dry periods than shallow-rooted plants. No-till seeding helps to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion.

Because of the slope, this soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Septic tank absorption fields should be installed on the better suited adjacent soils. Sloughing is a hazard if the soil is excavated. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys.

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

CkB—Cincinnati silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on ridges and low knolls on loess-mantled Illinoian till plains. Most areas are irregularly shaped and are 3 to 10 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil extends to a depth of about 60 inches. It is strong brown, friable silt loam in the upper part; a fragipan of yellowish brown, very firm, brittle loam in the next part; and yellowish brown, firm clay loam in the lower part. In places the slope is 0 to 2 percent or 6 to 9 percent. In some areas the mantle of loess is less than 18 inches thick, and in other areas it is 40 to 60 inches thick.

Included with this soil in mapping are small areas of Alford soils, which do not have a fragipan, and areas of the moderately well drained Coshocton and Keene soils. The included soils are in landscape positions similar to those of the Cincinnati soil. They make up about 15 percent of most areas.

Permeability is moderate above the fragipan in the Cincinnati soil and slow or moderately slow in the fragipan. Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 30 to 48 inches during extended wet periods. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the fragipan.

Most areas are used as cropland or pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. The hazard of erosion is moderate. A surface crust forms in tilled areas after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including hay and cover crops in the crop rotation, and returning crop residue to the soil help to control erosion and minimize crusting. Grassed waterways also help to control erosion.

This soil is well suited to hay and pasture. If properly managed, it is well suited to grazing in winter and early in spring, but compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

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

Because of the seasonal wetness and the slow or moderately slow permeability, this soil is only moderately suited to building site development and is poorly suited to septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area and installing the distribution lines above the fragipan and as close to the surface as possible improve the capacity of the fields to absorb effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

CkC2—Cincinnati silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on ridgetops and side slopes on loess-mantled Illinoian till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 450 feet long. Most areas are irregularly shaped and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 81 inches thick. The upper part is strong brown, friable silt loam; the next part is a fragipan of yellowish brown, mottled, very firm, brittle loam and clay loam; and the lower part is yellowish brown, mottled, firm clay loam. The substratum to a depth of about 99 inches is dark yellowish brown, firm loam. In some areas the silty mantle is less than 18 inches thick. In other areas the slope is 12 to 18 percent.

Included with this soil in mapping are small areas of the well drained Alford soils, which do not have a fragipan, and areas of the moderately well drained Coshocton and Keene soils. The included soils are in landscape positions similar to those of the Cincinnati soil. They make up about 20 percent of most areas.

Permeability is moderate above the fragipan in the Cincinnati soil and slow or moderately slow in the fragipan. Available water capacity is moderate. Runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 30 to 48 inches during extended wet periods. Water moves laterally along the top of the fragipan and sometimes seeps to the surface. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain grown in rotation with meadow crops. The hazard of erosion is severe in tilled areas. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface and crop rotations that include hay or cover crops help to control erosion and minimize crusting. Contour stripcropping and grassed waterways also help to control erosion. Many areas are well suited to contour stripcropping and no-till farming.

This soil is well suited to hay and pasture. If properly managed, it is well suited to grazing in winter and early in spring, but compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

Because of the slope, the seasonal wetness, and the slow or moderately slow permeability, this soil is only moderately suited to building site development and is

poorly suited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table and intercept lateral seepage along the top of the fragipan. Enlarging the absorption area and installing the distribution lines on the contour and in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent and help to prevent seepage. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

CmC2—Clarksburg silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on slightly concave foot slopes at the base of the steeper hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth or slightly concave and commonly are 150 to 300 feet long. Most areas are long and narrow and are 5 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 49 inches thick. The upper part is yellowish brown, friable silt loam and yellowish brown, mottled, firm silty clay loam. The next part is a fragipan of dark yellowish brown, mottled, very firm, brittle silty clay loam. The lower part is dark yellowish brown, mottled, friable channery silt loam. The substratum to a depth of about 60 inches is dark yellowish brown, friable channery silt loam. In places the fragipan is weakly developed. In a few areas the slope is 12 to 18 percent.

Included with this soil in mapping are small areas of the well drained Mentor soils on the lower part of the slopes and the well drained Brownsville soils on the upper part. Also included are some springs and seeps. Inclusions make up about 20 percent of most areas.

Permeability is moderate above the fragipan in the Clarksburg soil and slow or moderately slow in the fragipan. Available water capacity is moderate. Runoff is rapid in cultivated areas. Tilth is good. The seasonal high water table is perched at a depth of about 18 to 36 inches during extended wet periods. Water moves laterally along the top of the fragipan and sometimes surfaces as hillside seeps, especially on the lower part of the slopes. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are used for pasture or hay. Some areas are used for row crops or small grain. A few areas are wooded.

Because of a severe hazard of erosion in tilled areas, this soil is only moderately suited to corn and small grain grown in rotation with meadow crops. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface and crop rotations that include hay or cover crops help to control erosion and minimize crusting. Contour stripcropping and grassed waterways also help to control erosion. Natural drainage is adequate for most crops, but random subsurface drains may be needed to remove excess water in areas of seeps and springs.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, the seasonal wetness, the slow or moderately slow permeability, and a moderate shrink-swell potential, this soil is only moderately suited to building site development and is poorly suited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields lower the seasonal high water table and intercept lateral seepage along the top of the fragipan. Enlarging the absorption area and installing the distribution lines on the contour and in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

CmD2—Clarksburg silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, moderately well drained soil is on slightly concave foot

slopes at the base of the steeper hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth or slightly concave and commonly are 150 to 300 feet long. Most areas are long and narrow and are 5 to 25 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 55 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam. The next part is a fragipan of yellowish brown, very firm, brittle silty clay loam and channery silty clay loam. The lower part is yellowish brown, mottled channery silty clay loam. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm channery silt loam. In a few areas the slope is 10 to 12 percent or 18 to 22 percent. In some areas the fragipan is weakly developed.

Included with this soil in mapping are small areas of the well drained Mentor and Brownsville soils. Mentor soils are on the lower part of the slopes, and Brownsville soils are on the upper part. Also included are some springs and seeps. Inclusions make up about 15 percent of most areas.

Permeability is moderate above the fragipan in the Clarksburg soil and slow or moderately slow in the fragipan. Available water capacity is moderate. Runoff is very rapid in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Water moves laterally along the top of the fragipan. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are used for pasture or hay. Some areas are used for row crops or small grain. A few areas are wooded.

This soil is poorly suited to cultivated crops. In tilled areas the hazard of erosion is very severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface and crop rotations that include hay or cover crops help to control erosion and minimize crusting. Contour stripcropping and grassed waterways also help to control erosion. Natural drainage is adequate for most crops, but random subsurface drains may be needed to remove excess water in areas of seeps and springs.

This soil is moderately suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a very severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, the seasonal wetness, the slow or moderately slow permeability, and a moderate shrink-swell potential, this soil is poorly suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields lower the seasonal high water table and intercept lateral seepage along the top of the fragipan. Enlarging the absorption area and installing the distribution lines on the contour and in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

Cn—Condit silt loam. This deep, nearly level, poorly drained soil is in slight depressions and swales and on flats on Wisconsinan till plains. It receives runoff from the adjacent slopes and is subject to ponding. Most areas in swales and on flats are irregularly shaped and are 4 to 20 acres in size. Areas in closed depressions are roughly oval and are 2 to 5 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 11 inches thick. The subsoil is 27 inches of dark gray and yellowish brown, mottled, firm silty clay loam and clay loam. The substratum to a depth of about 80 inches is brown, mottled, calcareous, firm loam glacial till. In some areas the soil is somewhat poorly drained. In other areas the surface layer has alluvial sediments washed from the adjacent slopes.

Included with this soil in mapping are small areas of the very poorly drained Pewamo soils in depressions and along drainageways and small areas of the moderately well drained Centerburg soils on low knolls. Included soils make up about 10 percent of most areas.

Permeability is slow in the Condit soil. Available water capacity is moderate. Runoff is very slow or ponded. The seasonal high water table is near or above the surface during extended wet periods. Tilth is good. The root zone is deep in drained areas. It is restricted by the water table in undrained areas.

Most areas are used as cropland or pasture. Some areas are wooded or covered with brush, especially if they are not drained.

If drained, this soil is moderately suited to corn, soybeans, and small grain, but the wetness delays planting and limits the choice of crops that can be grown. Undrained areas commonly do not have suitable natural outlets for subsurface drains. Open ditches and surface drains can reduce ponding and provide drainage outlets. Closely spaced subsurface drains help to lower the water table in areas where adequate outlets are available. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The species that can withstand wetness, such as alsike clover, should be selected for planting.

This soil is well suited to the species of trees that grow well on wet soils. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Frequent, light thinning or harvesting reduces the hazard of windthrow and improves the vigor of the stand. Logging when the soil is frozen or during the drier parts of the year minimizes compaction and facilitates the use of equipment. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the ponding and the slow permeability, this soil is poorly suited to building site development and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage.

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

CoB—Coshocton silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on unglaciated ridgetops. Most areas are long and narrow and are 3 to 20 acres in size. Some areas are as large as 50 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 29 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The substratum is brown, mottled, firm silty clay loam. Soft shale bedrock is at a depth of about 45 inches. In some places the soil is eroded and has a surface layer that is silty clay loam and that has a higher content of coarse fragments. In other places the slope is 6 to 9 percent. In some areas the upper part of the soil is glacial till. In a few areas the soil is well drained. In places the subsoil has more clay.

Included with this soil in mapping are small areas of moderately deep soils. These soils are in the same landscape positions as the Coshocton soil. They make up about 15 percent of most areas.

Permeability is slow or moderately slow in the Coshocton soil. Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Many areas are used for hay or pasture. Some areas are used for row crops, small grain, or woodland or are covered with brush.

This soil is well suited to corn and small grain. In tilled areas the hazard of erosion is moderate. A surface crust forms after hard rains. Farming on the contour, including grasses and legumes in the crop rotation, returning crop residue to the soil, and applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate.

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

Because of the seasonal wetness and a moderate shrink-swell potential, this soil is only moderately suited to building site development. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and

erosion can be reduced by maintaining a plant cover where possible on the construction site.

Because of the seasonal wetness and the slow or moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Perimeter drains around the absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

CoC2—Coshocton silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is mainly on unglaciated ridgetops. In a few areas it is on hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 400 feet long. Most areas are long and narrow and are 5 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish brown and strong brown silt loam and silty clay loam. The next part is strong brown and light yellowish brown, mottled, firm silty clay loam. The lower part is light brownish gray and brown, mottled, firm silty clay and silty clay loam. The substratum is pale brown and grayish brown, mottled, firm silty clay loam. Soft shale bedrock is at a depth of about 67 inches. In some areas the upper part of the soil is glacial till or sandy loam colluvium. In some places the slope is 2 to 6 percent or 12 to 15 percent. In other places the surface is stony. In a few areas the subsoil is yellowish red. In places the soil is less eroded.

Included with this soil in mapping are small areas of moderately deep soils, especially on the upper part of the slopes. Also included are small areas of severely eroded soils and the well drained Rigley soils on the upper part of the slopes and small areas of the well drained Brownsville soils on the lower part of the slopes. In the severely eroded soils, the surface layer is silty clay loam and tilth is fair. Also included, especially on the lower part of some slopes, are seeps and springs. Inclusions make up about 20 percent of most areas.

Permeability is slow or moderately slow in the Coshocton soil. Available water capacity is moderate. Runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used as hayland, pasture, or woodland or are covered with brush. Some areas are used for row crops or small grain.

Because of the slope and a severe hazard of erosion, this soil is only moderately suited to corn and small grain. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. Contour stripcropping, crop rotations that include hay or cover crops, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The seeps and springs on the lower part of the slopes interfere with tillage. Subsurface drains help to remove the excess water.

This soil is well suited to hay and pasture. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

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

Because of the slope, the seasonal wetness, and a moderate shrink-swell potential, this soil is only moderately suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

Because of the seasonal wetness and the slow permeability, this soil is poorly suited to septic tank absorption fields. Interceptor drains upslope from the absorption fields lower the seasonal high water table and intercept lateral seepage from the higher adjacent soils. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface.

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

CoD2—Coshocton silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, moderately well drained soil is on unglaciated hillsides and on some ridgetops. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are

uniform and commonly are 200 to 600 feet long. Most areas on hillsides are long and winding and are 20 to more than 200 acres in size. Areas on ridgetops are long and narrow and commonly are 18 to 80 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The substratum is dark grayish brown, mottled, firm silty clay loam. Soft shale bedrock is at a depth of about 55 inches. In some areas the soil is less eroded. In other areas the slope is 6 to 12 percent. In a few areas the upper part of the soil is sandy loam colluvium. In places the surface is stony.

Included with this soil in mapping are small areas of the well drained Brownsville soils on the lower part of the slopes, small areas of severely eroded soils, and small areas of moderately deep soils on the upper part of the slopes. Also included are small seeps. Inclusions make up about 20 percent of most areas.

Permeability is slow or moderately slow in the Coshocton soil. Available water capacity is moderate. Runoff is very rapid in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas were farmed in the past and are now used as hayland, pasture, or woodland or are covered with brush. Some areas are used for row crops or small grain.

Because of the slope and a very severe hazard of erosion, this soil is poorly suited to cultivated crops. Erosion has reduced natural fertility and increased the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. Contour stripcropping, crop rotations that include hay or cover crops, grassed waterways, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting. Seeps and springs interfere with tillage. Subsurface drains help to remove excess water.

This soil is moderately suited to hay and pasture. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. On south aspects, the seedling mortality rate can be reduced by planting seedlings that have been transplanted once.

Access roads to oil and gas wells are subject to severe gully erosion in areas of this soil. The hazard of erosion can be reduced by constructing the roads on the lowest possible grade and by establishing water bars.

Because of the slope, the seasonal wetness, the slow or moderately slow permeability, and a moderate shrink-swell potential, this soil is poorly suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. Interceptor drains upslope from septic tank absorption fields lower the seasonal high water table and intercept lateral seepage from the higher adjacent soils. Enlarging the absorption area and installing the distribution lines on the contour improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

CoE2—Coshocton silt loam, 18 to 25 percent slopes, eroded. This deep, steep, moderately well drained soil generally is on unglaciated hillsides. In a few areas it is on high knolls. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are 200 to 400 feet long. Most areas on hillsides are long and winding and are 20 to 40 acres in size, but a few areas are more than 100 acres in size. Areas on high knolls are roughly oval and are 10 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 39 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam, and the lower part is light brownish gray and yellowish brown, mottled, firm silty clay loam. The substratum is yellowish brown, mottled, firm silty clay loam. Shale bedrock is at a depth of about 60 inches. In some areas the soil is less eroded. In other areas the slope is 15 to 18 percent or 25 to 35

percent. In a few areas the upper part of the soil is sandy loam colluvium.

Included with this soil in mapping are small areas of severely eroded soils and the well drained Brownsville soils on the lower part of the slopes and small areas of moderately deep soils on the upper part of some slopes. Also included are small seeps. Inclusions make up about 20 percent of most areas.

Permeability is slow or moderately slow in the Coshocton soil. Available water capacity is moderate. Runoff is very rapid in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas were farmed in the past but are now wooded or covered with brush. Some areas are used as pasture.

Because of the slope and a very severe hazard of erosion, this soil generally is unsuited to cultivated crops and small grain. The slope limits the use of farming equipment.

Because of the slope and the very severe hazard of erosion, this soil is only moderately suited to pasture and is poorly suited to hay. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. On south aspects, the seedling mortality rate can be reduced by planting seedlings that have been transplanted once.

Access roads to oil and gas wells are subject to severe gully erosion in areas of this soil. The hazard of erosion can be reduced by constructing the roads on the lowest possible grade and by establishing water bars.

Because of the slope, the seasonal wetness, the slow or moderately slow permeability, and a moderate shrink-swell potential, this soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

CrA—Crane silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on flats and in slight swales on Wisconsinan outwash terraces. Most areas are irregularly shaped or elongated and are 5 to 30 acres in size.

Typically, the surface layer is black, friable silt loam about 8 inches thick. The subsurface layer also is black, friable silt loam. It is about 5 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown, mottled, firm and friable silty clay loam and clay loam, and the lower part is dark grayish brown, mottled, friable gravelly sandy clay loam and gravelly sandy loam. The substratum to a depth of about 80 inches is brown very gravelly loamy sand. In some areas the soil is very poorly drained. In other areas the surface layer is very fine sandy loam or loam.

Included with this soil in mapping are small areas of moderately well drained soils on slight rises. Also included are areas of soils that have a loamy substratum. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Crane soil and very rapid in the substratum. Available water capacity is high. Runoff is very slow. Tilth is good. The seasonal high water table is at a depth of 12 to 36 inches during extended wet periods. In drained areas the root zone is deep.

Most areas are used as cropland. A few areas are used as pasture.

If drained, this soil is well suited to corn, soybeans, and small grain. In undrained areas the wetness delays planting and limits the choice of crops that can be grown. Surface and subsurface drains are needed.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The species that can withstand some wetness should be selected for planting.

Because of the seasonal wetness, this soil is poorly suited to building site development and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Sloughing is a hazard if the soil is excavated. Properly landscaping building sites and absorption fields results in good surface drainage.

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

FaD—Fairpoint silty clay loam, 8 to 25 percent slopes. This deep, sloping to steep, well drained soil is on the sides of mine spoil ridges in areas that have been surface mined for coal. The substratum is a mixture of rock fragments and partly weathered fine-earth material that was in or below the profile of the original soil. The soil has been reclaimed by grading and by blanketing the surface with a layer of material from the original topsoil or with a combination of the original topsoil and subsoil stockpiled during mining. Most areas are irregularly shaped and range from 4 to 30 acres in size.

Typically, the surface layer is yellowish brown, firm silty clay loam about 6 inches thick. The substratum to a depth of about 60 inches is variegated yellowish brown, pale brown, very dark gray, and gray, very firm very shaly and very gravelly silty clay loam. In some areas the slope is less than 8 percent. In other areas the soil is strongly acid or very strongly acid near the surface.

Included with this soil in mapping are a few small areas where the slope is 25 to 30 percent. These areas are near the top of high walls. Also included are areas that have not been reclaimed and have stones on the surface and in the surface layer. Inclusions make up about 25 percent of most areas.

Permeability is moderately slow in the Fairpoint soil. Available water capacity is low. Runoff is very rapid. Tilth is poor. The depth of the root zone varies greatly within short distances because the soil material varies in density.

Most areas are covered with grasses. Because of the slope, the hazard of erosion, droughtiness, and low fertility, this soil is poorly suited to row crops and small grain. In tilled areas the hazard of erosion is very severe. This soil is well suited to no-till farming. A protective plant cover and mulch help to control runoff and erosion and increase the infiltration rate.

This soil is moderately suited to hay and pasture. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. No-till seeding helps to control erosion. Split applications of nitrogen fertilizer increase forage production. Drought reduces yields of hay late in the growing season.

This soil is best suited to trees that can withstand drought. Grasses and legumes protect the surface during periods when the trees are becoming established. Mechanical tree planters can be used on this soil.

Onsite investigation is needed to determine suitability for building site development and septic tank absorption fields. In areas where it has settled, this soil is moderately suited or poorly suited to building site development and poorly suited to septic tank absorption fields. The depth of the soil over bedrock and runoff of storm water should be considered during onsite investigation. Areas where the soil is deeper over bedrock generally require longer periods for settlement. Because of buried trees and woody debris and the hazard of subsidence, a few areas that originally were wooded should not be selected for building site development. Erosion is a hazard. It can be controlled by mulching and by establishing a temporary plant cover. Land shaping is needed in some areas.

Buildings should be designed so that they conform to the natural slope of the land. The shrink-swell potential is a limitation on sites for dwellings. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent.

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

FcA—Fitchville silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil generally is on flats and in slight depressions on Wisconsinan lake plains and slack-water terraces. In a few areas it is in draws extending into the uplands. Most areas are irregularly shaped and are 2 to 30 acres in size. Some areas are more than 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 10 inches thick. The subsoil is about 52 inches of brown and yellowish brown, mottled, firm silt loam and silty clay loam. The substratum to a depth of about 70 inches is yellowish brown, mottled, firm silty clay loam. In some areas the subsoil is gravelly loam or gravelly silt loam. In areas that receive eroding sediments from the higher adjacent soils, the surface layer is thicker.

Included with this soil in mapping are small areas of the very poorly drained Luray soils. These soils are in the same landscape positions as the Fitchville soil. Also included are areas of the moderately well drained Glenford soils on slight rises and low knolls; a few small areas of soils that have a subsoil or substratum of silty clay; and, in some areas along streams, narrow strips of soils that are subject to flooding. Included soils make up about 15 percent of most areas.

Permeability is moderately slow in the Fitchville soil. Available water capacity is high. Surface runoff is slow. The seasonal high water table is at a depth of 12 to 30 inches during extended wet periods. Tilth is good. In

drained areas the root zone is deep.

Most areas are used for row crops or small grain. Some areas are used as hayland or pasture. A few areas are wooded. Most of the wooded areas are undrained.

If drained, this soil is well suited to corn, soybeans, and small grain, but the seasonal wetness delays planting and limits the choice of crops that can be grown. Surface and subsurface drains commonly are used to improve drainage. In places adequately draining the soil is difficult. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing when the soil is too wet helps to keep the pasture in good condition. 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.

Because of the seasonal wetness and the moderately slow permeability, this soil is poorly suited to building site development and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage.

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

FcB—Fitchville silt loam, 2 to 6 percent slopes. This deep, gently sloping, somewhat poorly drained soil is mainly on low knolls on Wisconsinan lake plains and slack-water terraces. In a few areas it is on foot slopes and in draws that extend into the uplands. Most areas are irregularly shaped and are 2 to 15 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsoil is yellowish brown, mottled, firm silty clay loam about 40 inches thick. The substratum to a depth of about 60 inches also is yellowish brown, mottled, firm silty clay loam. In some areas the subsoil is gravelly loam or gravelly silt loam.

Included with this soil in mapping are small areas of the very poorly drained Luray soils along drainageways and small areas of the moderately well drained Glenford soils on the upper part of the slopes. Also included, along streams, are narrow strips of soils that are subject to flooding. Included soils make up about 10 percent of most areas.

Permeability is moderately slow in the Fitchville soil. Available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 12 to 30 inches during extended wet periods. Tilth is good. In drained areas the root zone is deep.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. A few areas are wooded.

If drained, this soil is well suited to corn, soybeans, and small grain. The hazard of erosion and the seasonal wetness are management concerns. In tilled areas the hazard of erosion is moderate. A surface crust forms after hard rains. Including meadow crops in the crop rotation and returning crop residue to the soil help to control erosion and minimize crusting. Grassed waterways also help to control erosion. Adequately drained areas are suited to no-till farming or another system of conservation tillage that leaves crop residue on the surface. A drainage system can help to remove excess water in areas where suitable outlets are available.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate. No-till seeding helps to control erosion. The species that can withstand some wetness should be selected for planting.

This soil is well suited to trees that can withstand some wetness. No major hazards or limitations affect planting or harvesting.

Because of the seasonal wetness and the moderately slow permeability, this soil is poorly suited to building site development and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

Figure 11.—Rill and gully erosion on Fox gravelly loam, 12 to 18 percent slopes, eroded. Conventional tillage methods were used when the corn was planted.

FoD2—Fox gravelly loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil is on short, dissected side slopes on Wisconsinan outwash terraces and kames. Erosion has removed part of the original surface layer (fig. 11). Tillage has mixed subsoil material into the present surface layer. Slopes generally are 60 to 200 feet long. Most areas on terrace breaks are long, narrow, and winding and are 5 to 30 acres in size. Areas on kames are roughly circular and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable gravelly loam about 4 inches thick. The subsoil is about 25 inches thick. The upper part is dark yellowish brown, brown, and reddish brown, firm gravelly clay loam, and the lower part is brown, friable gravelly loam and yellowish brown, very friable very gravelly sandy loam. The substratum to a depth of about 60 inches is brown, calcareous, loose very gravelly sand. In some areas the slope is 9 to 12 percent or 18 to 21 percent. In other areas depth to the calcareous substratum is less than 24 inches.

Included with this soil in mapping are small areas of severely eroded soils on the upper part of the slopes. Also included, especially on kames, are small areas of soils that have a loamy substratum. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Fox soil and rapid or very rapid in the substratum. Available water capacity is low. Runoff is very rapid in cultivated areas. Tilth is fair. The root zone generally is moderately deep.

Most areas are used as cropland. These areas commonly are on narrow slope breaks in the dominantly flatter fields. Some areas are used as pasture or hayland. A few areas are wooded or covered with brush.

Because of the slope, a very severe hazard of erosion, and droughtiness, this soil is poorly suited to cultivated crops. Significant erosion has occurred, reducing the level of natural fertility, the depth to sand and gravel, and the available water capacity of the soil. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including long-term hay crops in the crop rotation, and returning crop residue to the soil help to control erosion and conserve moisture.

This soil is moderately suited to hay and pasture. Because of the good natural drainage, it is well suited

to grazing in winter and early in spring. Growing forage species helps to control erosion. If the pasture is plowed during seedbed preparation or is overgrazed, however, erosion is a very severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Drought limits yields of hay late in the growing season.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

Because of the slope and a poor filtering capacity, this soil is poorly suited to building site development and septic tank absorption fields. Designing buildings so that they conform to the natural slope of the land minimizes the need for cutting and filling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Because of the poor filtering capacity, the effluent can pollute ground water. Sloughing is a hazard if the soil is excavated. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys. The depth to usable layers, the thickness of those layers, and the gradation of individual grain sizes vary, especially in areas on kames.

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

FoE2—Fox gravelly loam, 18 to 25 percent slopes, eroded. This deep, steep, well drained soil is on short, dissected side slopes on Wisconsinan outwash terraces and kames. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are generally smooth and are 60 to 200 feet long. Most areas on outwash terraces are long, narrow, and winding and are 5 to 20 acres in size. Areas on kames are roughly circular and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable gravelly loam about 5 inches thick. The subsoil is about 21 inches of dark yellowish brown, friable gravelly loam and gravelly clay loam. The substratum to a depth of about 60 inches is brown, calcareous, loose gravelly sand. In some areas the slope is 15 to 18 percent or 25 to 35 percent. In other areas the depth to calcareous sand and gravel is less than 24 inches.

Included with this soil in mapping are small areas of severely eroded soils on the upper part of the slopes. Also included, especially on kames, are small areas of soils that have a loamy substratum. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Fox soil and rapid or very rapid in the substratum. Available water capacity is low. Runoff is very rapid in cultivated areas. Tilth is fair. The root zone generally is moderately deep.

Most areas are used as pasture or woodland or are covered with brush. Only a few areas are used as cropland.

Because of the slope, a very severe hazard of erosion, and droughtiness, this soil is generally unsuited to cultivated crops. The slope limits the use of farming equipment.

Because of the slope and the very severe hazard of erosion, this soil is only moderately suited to pasture and is poorly suited to hay. The hazard of erosion is very severe if the pasture is reseeded by conventional tillage methods. No-till seeding helps to control erosion. Drought limits yields of hay late in the growing season.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. The seedling mortality rate can be reduced by mulching and by planting seedlings that have been transplanted once.

Because of the slope and a poor filtering capacity, this soil is poorly suited to building site development and is generally unsuited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Sloughing is a hazard if the soil is excavated. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is a probable source of sand and gravel. The thickest deposits commonly are on terraces in the major stream valleys. The depth to usable layers, the thickness of those layers, and the gradation of individual grain sizes vary, especially in areas on kames.

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

FrB—Frankstown Variant-Mertz complex, 2 to 6 percent slopes, very stony. These gently sloping, well drained soils are on unglaciated ridgetops. The Frankstown Variant soil is moderately deep, and the Mertz soil is deep. Stones and boulders 10 to 36 inches long cover about 0.1 to 3.0 percent of the surface. Areas generally are irregularly shaped and are 5 to 50 acres in size. They are about 45 percent Frankstown Variant silt loam and 35 percent Mertz very cherty silt loam. The two soils occur as areas so intricately mixed

that separating them in mapping was not practical.

Typically, the Frankstown Variant soil has a surface layer of very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is yellowish brown, friable silt loam about 3 inches thick. The subsoil is about 19 inches of yellowish brown and strong brown, friable and firm silt loam and cherty silty clay loam. Flint bedrock is at a depth of about 25 inches. In places the soil is shallow over flint bedrock. In some areas it is not stony.

Typically, the Mertz soil has a surface layer of very dark grayish brown, friable very cherty silt loam about 3 inches thick. The subsurface layer is brown, friable very cherty silt loam about 2 inches thick. The subsoil is about 46 inches thick. The upper part is yellowish brown and strong brown, friable very cherty silt loam, and the lower part is yellowish red and strong brown, firm very cherty silty clay loam. The substratum to a depth of about 68 inches is strong brown, firm very cherty silty clay loam. In places the substratum is mottled and has fewer chert fragments.

Included with these soils in mapping are areas of the moderately well drained Guernsey soils. These included soils are in landscape positions similar to those of the Frankstown Variant and Mertz soils or are at slightly different elevations. Also included are scattered areas where numerous prehistoric pits were excavated for flint. Inclusions make up about 20 percent of most areas.

Permeability is moderate in the Frankstown Variant soil and moderately slow in the Mertz soil. Available water capacity is low in both soils. Runoff is medium. The root zone is moderately deep in the Frankstown Variant soil and deep in the Mertz soil.

Most areas are wooded. A few areas have been developed for recreational uses. Because of the stoniness and droughtiness, these soils are generally unsuitable as cropland and pasture. They are well suited to trees, but the droughtiness, the depth to bedrock in the Frankstown Variant soil, and the high content of flint fragments in the Mertz soil limit tree growth. In areas of the Mertz soil, mulching and planting seedlings that have been transplanted once reduce the seedling mortality rate. In areas of the Frankstown Variant soil, frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow. Plant competition can be controlled on both soils by removing vines and the less desirable trees and shrubs.

These soils are moderately suited or well suited to building site development. They are poorly suited or generally unsuited to septic tank absorption fields because of the depth to bedrock in the Frankstown Variant soil and the moderately slow permeability in the Mertz soil. The Mertz soil is better suited to these uses than the Frankstown Variant soil. The hard flint bedrock underlying the Frankstown Variant soil severely limits excavation. As a result, this soil is better suited to dwellings without basements than to dwellings with basements. Also, the sewage treatment and disposal systems in areas of this soil should not be conventional onsite systems. In areas of the Mertz soil, enlarging the absorption area improves the capacity of septic tank absorption fields to absorb effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

The land capability classification is VIs. The woodland ordination symbol is 4D in areas of the Frankstown Variant soil and 4F in areas of the Mertz soil.

GfA—Glenford silt loam, 0 to 2 percent slopes. This deep, nearly level, moderately well drained soil is mainly on flats on Wisconsinan slack-water terraces and on lake plains. In a few areas it is in upland draws. Most areas are irregularly shaped and are 10 to 30 acres in size, but a few areas are larger than 50 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 44 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is yellowish brown, mottled, friable and firm silt loam and silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, mottled, firm silt loam. In some areas the subsoil or substratum contains more sand or gravel.

Included with this soil in mapping are small areas of the somewhat poorly drained Fitchville soils and small areas of the very poorly drained Luray soils on flats and in depressions. Also included are a few small areas of soils that have a subsoil or substratum of silty clay. Included soils make up about 10 percent of most areas.

Permeability is moderately slow in the Glenford soil. Available water capacity is moderate. Runoff is slow. The seasonal high water table is at a depth of about 24 to 42 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for row crops, small grain, hay, or pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. Natural drainage generally is adequate for most crops, but random subsurface drains may be needed to remove excess water in the wetter included areas. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil and applying a system of conservation tillage that leaves crop residue on the surface minimize crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water

infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

Because of the suitability for cropland, only a few areas are wooded. This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the seasonal wetness, the shrink-swell potential, and the moderately slow permeability, this soil is only moderately suited to building site development and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling along foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage.

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

GfB—Glenford silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is mainly on low knolls and slight rises on Wisconsinan lake plains and slack-water terraces. In a few areas it is on foot slopes. Most areas are irregularly shaped and are 10 to 30 acres in size. A few areas are larger than 50 acres.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 36 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown and dark yellowish brown, mottled, firm silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, mottled, firm silty clay loam. In some areas the slope is 6 to 12 percent. In places the subsoil and substratum are loam.

Included with this soil in mapping are small areas of the very poorly drained Luray and poorly drained Sebring soils in depressions and along drainageways and a few small areas of soils that have a clayey subsoil and substratum. Also included are some seeps on the lower part of the slopes. Inclusions make up about 10 percent of most areas.

Permeability is moderately slow in the Glenford soil. Available water capacity is moderate. Runoff is medium. The seasonal high water table is at a depth of 24 to 42 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used as cropland or pasture (fig. 12). A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. In tilled areas erosion is a moderate hazard. A surface crust forms after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including meadow crops in the crop rotation, returning crop residue to the soil, and establishing grassed waterways help to control erosion and minimize crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and increased runoff result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

Because of the suitability for cropland, only a few areas are wooded. This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the seasonal wetness, a moderate shrink-swell potential, and the moderately slow permeability, this soil is only moderately suited to building site development and septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with a material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Properly landscaping building sites and absorption fields results in good surface drainage.

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

GnB—Guernsey silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on unglaciated ridgetops. Most areas are irregularly shaped and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 44 inches thick. The upper part is yellowish brown, friable silt loam. The next part is yellowish brown, brownish yellow, and light brownish gray, mottled, firm and very firm silty clay loam and silty clay. The lower part is yellowish brown, mottled, very firm silty clay loam. The substratum is gray, very firm silty clay. Soft siltstone bedrock is at a depth of about 71 inches. In some areas the slope is 0 to 2 percent or 6 to 9 percent.

Included with this soil in mapping are small areas of Alford and Keene soils. These soils are in landscape positions similar to those of the Guernsey soil. Alford soils are well drained. Keene soils contain less clay in the upper part than the Guernsey soil. Also included are

Figure 12.—Bales of wheat straw on Glenford silt loam, 2 to 6 percent slopes. This soil is well suited to crops and pasture.

small areas of somewhat poorly drained soils on the lower part of the slopes. Included soils make up about 10 percent of most areas.

Permeability is slow or moderately slow in the Guernsey soil. Available water capacity is moderate. Runoff is medium in cultivated areas. The shrink-swell potential is high. The seasonal high water table is perched at a depth of 24 to 42 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is well suited to a cropping system of corn, small grain, and hay. Erosion is the main hazard. A surface crust forms in tilled areas after hard rains. Applying a system of conservation tillage that leaves crop residue on the surface, including meadow crops in the crop rotation, and returning crop residue to the soil help to maintain tilth, minimize crusting, and control erosion. Grassed waterways also help to control erosion.

This soil is well suited to hay and pasture. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate. No-till seeding helps to control erosion.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is moderately suited to building site development, but the seasonal wetness and the high shrink-swell potential are limitations, especially on sites for buildings with basements. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

Because of the seasonal wetness and the slow or moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Perimeter drains around the absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

GnC2—Guernsey silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil generally is on unglaciated ridgetops. In a few areas it is on unglaciated hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are smooth and are 100 to 300 feet long. Most areas on ridgetops are roughly oval and are 5 to 15 acres in size. Most areas on hillsides are long and narrow and are 10 to 25 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 42 inches of yellowish brown, firm silty clay loam and silty clay. It is mottled below a depth of about 12 inches. The substratum is yellowish brown, mottled, very firm silty clay. Soft shale bedrock is at a depth of about 60 inches. In some areas the slope is 2 to 6 percent or 12 to 15 percent. In other areas the soil is less eroded.

Included with this soil in mapping are small areas of the well drained Rigley soils on the lower part of the slopes and areas of severely eroded soils on the upper part of the slopes. The severely eroded soils have a surface layer of silty clay loam. Also included are some seeps on hillsides. Inclusions make up about 10 percent of most areas.

Permeability is slow or moderately slow in the Guernsey soil. Available water capacity is moderate. Runoff is rapid in cultivated areas. The shrink-swell potential is high. The seasonal high water table is perched at a depth of 24 to 42 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for hay or pasture. Some areas are used for row crops or small grain or are wooded.

This soil is moderately suited to corn and small grain. In tilled areas erosion is a severe hazard. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface and crop rotations that include hay or cover crops help to maintain tilth, control erosion, and minimize crusting. Grassed waterways also help to control erosion.

This soil is well suited to hay and pasture. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. No-till seeding helps to control erosion.

This soil is well suited to trees. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

Because of the slope, the seasonal wetness, and the high shrink-swell potential, this soil is only moderately suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

Because of the slope, the seasonal wetness, and the slow or moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Perimeter drains around the absorption fields and interceptor drains upslope from the fields lower the seasonal high water table and intercept lateral seepage. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface.

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

GnD—Guernsey silt loam, 12 to 18 percent slopes. This deep, moderately steep, moderately well drained soil is dominantly on unglaciated hillsides. In a few areas it is on ridgetops. Slopes commonly are smooth and are 100 to 300 feet long. Most areas on hillsides are narrow and winding and are 20 to 60 acres in size. Most areas on ridgetops are roughly oval or circular.

Typically, the surface layer is very dark grayish brown, friable silt loam about 3 inches thick. The subsurface layer is brown, friable silt loam about 4 inches thick. The subsoil is about 44 inches of yellowish brown, firm silty clay loam and silty clay. It is mottled below a depth of about 18 inches. The substratum is yellowish brown, mottled, firm silty clay loam. Soft shale bedrock is at a depth of about 60 inches. In some areas the slope is 10 to 12 percent. In other areas the soil is eroded. In places, the surface layer has chert fragments or stones are on the surface.

Included with this soil in mapping are small areas of the well drained Rigley soils and Berks soils. Rigley soils are on the lower part of some slopes. Berks soils are in landscape positions similar to those of the Guernsey soil. Also included are seeps on the lower part of some slopes. Inclusions make up about 25 percent of most areas.

Permeability is slow or moderately slow in the

Guernsey soil. Available water capacity is moderate. Runoff is very rapid in cultivated areas. The shrink-swell potential is high. The seasonal high water table is perched at a depth of 24 to 42 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are wooded or are covered with brush. Some areas are used as hayland or pasture. A few areas are used for row crops or small grain.

This soil is poorly suited to cultivated crops. In tilled areas the hazard of erosion is very severe. A surface crust forms after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay or cover crops, and contour stripcropping help to control erosion and minimize surface crusting. Grassed waterways also help to control erosion.

This soil is moderately suited to hay and pasture. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. On south aspects, the seedling mortality rate can be reduced by planting seedlings that have been transplanted once.

Because of the slope, the seasonal wetness, the hazard of slippage, and the high shrink-swell potential, this soil is poorly suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. Minimizing cutting and filling helps to prevent slippage. Random subsurface drains that intercept lateral seepage from the higher adjacent soils and divert runoff from foundations help to prevent slippage, lower the seasonal high water table, and help to keep basements dry. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling along foundations with a material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling.

Because of the slope, the seasonal wetness, and the slow or moderately slow permeability, this soil is poorly suited to septic tank absorption fields. Perimeter drains around the absorption fields lower the seasonal high water table and intercept lateral seepage from the higher adjacent soils. Enlarging the absorption area and installing the distribution lines on the contour improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

HeF—Hazleton-Rock outcrop complex, 25 to 70 percent slopes. This map unit occurs as areas of a deep, very steep, well drained Hazleton soil intermingled with areas where sandstone crops out. The unit is on hillsides. The Hazleton soil is on the lower part of side slopes and on foot slopes. The Rock outcrop is on vertical cliffs and ledges on the upper part of side slopes and on shoulder slopes (fig. 13). Slopes are irregular and generally are 50 to 75 feet long. Areas commonly are long, narrow, and winding and range from 5 to 80 acres in size. Most are about 55 percent Hazleton soil and 25 percent Rock outcrop. The Hazleton soil and the Rock outcrop occur as areas so intricately mixed that separating them in mapping was not practical.

Typically, the Hazleton soil has a surface layer of black, very friable channery sandy loam about 2 inches thick. The subsurface layer is brown, very friable channery sandy loam about 3 inches thick. The subsoil is yellowish brown, very friable very channery sandy loam about 22 inches thick. The substratum is yellowish brown, very friable very channery sandy loam. Sandstone bedrock is at a depth of about 54 inches. In some areas the surface layer is stony. In other areas the soil is moderately deep over bedrock.

Included with the Hazleton soil and Rock outcrop in mapping are small areas of shallow soils. These soils are around the Rock outcrop on the upper part of the slopes. They make up about 20 percent of most areas.

Permeability is moderately rapid or rapid in the Hazleton soil. Runoff is very rapid. Available water capacity is low. The root zone is deep.

Most areas are wooded. Because of the slope, the Rock outcrop, droughtiness, and the hazard of erosion, this map unit is generally unsuited to cultivated crops and pasture. It is only moderately suited to trees because the low available water capacity slows tree growth and the slope and Rock outcrop severely restrict the use of equipment. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. The trees can be logged in areas above or below the Rock outcrop. In areas of the Hazleton soil on south aspects, the seedling mortality rate can be reduced by mulching or by planting seedlings that have been transplanted once.

Figure 13.—Rock outcrop in an area of Hazleton-Rock outcrop complex, 25 to 70 percent slopes.

Because of the slope, the Rock outcrop, and a poor filtering capacity, this map unit generally is unsuited to building site development and septic tank absorption fields. Some areas are scenic and can be used for hiking trails and lookout points. The hazard of erosion is severe if the plant cover is removed.

The land capability classification is VIIe. The woodland ordination symbol assigned to the Hazleton soil is 4R on north aspects and 3R on south aspects. The Rock outcrop is not assigned a woodland ordination symbol.

HkC2—Hickory silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on knolls, ridgetops, and dissected side slopes on Illinoian till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are smooth and are 150 to 500 feet long. Most areas are irregularly shaped and are 5 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 33 inches of yellowish brown, firm and very firm silty clay loam and clay loam. The substratum to a depth of about 80 inches is yellowish brown, very firm, calcareous clay loam glacial till. In some areas the slope is 2 to 6 percent or 12 to 15 percent. In places the substratum is silty clay loam. In a few areas the soil is moderately well drained.

Included with this soil in mapping are narrow bands of somewhat poorly drained soils along drainageways and areas of severely eroded soils on the upper part of the slopes. The severely eroded soils have a lower available water capacity than the Hickory soil and have

a thinner subsoil. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Hickory soil. Available water capacity is high. Runoff is rapid in cultivated areas. Tilth is good. The root zone is deep.

Many areas are used as cropland or pasture. Some areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain grown in rotation with meadow crops. Erosion is the main hazard. A surface crust forms in tilled areas after hard rains. Erosion has reduced the level of natural fertility and increased the need for lime and fertilizer. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, contour stripcropping, and grassed waterways help to control erosion. The soil is well suited to conservation tillage systems, including no-till farming.

This soil is well suited to hay and pasture. If well managed, it is suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied.

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

Because of the slope, the moderate permeability, and a moderate shrink-swell potential, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

HkD2—Hickory silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil commonly is on dissected side slopes on Illinoian till plains. In some areas it is on knolls. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are smooth and are 100 to 400 feet long. Most areas are irregularly shaped and range from 4 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is dark yellowish brown and yellowish brown, firm clay loam about 35 inches thick. The substratum to a depth of about 60 inches is dark yellowish brown, calcareous, firm clay loam glacial till. In some areas the slope is 9 to 12 percent or 18 to 25 percent. In other areas the substratum is silty clay loam. In a few places the soil is moderately well drained.

Included with this soil in mapping are narrow bands of the somewhat poorly drained Orrville soils on flood plains and some areas of severely eroded soils on the upper part of the slopes. The surface layer and subsoil of the severely eroded soils are thinner than those of the Hickory soil. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Hickory soil. Available water capacity is high. Runoff is very rapid in cultivated areas. Tilth is good. The root zone is deep.

Most areas are used for hay or pasture. Some areas are wooded. A few areas are used for row crops or small grain.

This soil is poorly suited to cultivated crops. In tilled areas the hazard of erosion is very severe. Erosion has reduced the level of natural fertility and increased the need for lime and fertilizer. Crop rotations that include hay and cover crops, contour stripcropping, grassed waterways, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion. The good drainage favors no-till farming.

This soil is moderately suited to hay and pasture. If well managed, it is suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. No-till seeding helps to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment.

Because of the slope, the moderate permeability, and a moderate shrink-swell potential, this soil is poorly suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Enlarging the absorption area improves the capacity of the fields to absorb the effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

HoB—Homewood silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained and well drained soil is on ridgetops, low knolls, and rises on Illinoian till plains. Most areas are irregularly shaped and are 5 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is clay loam about 56 inches thick. The upper part is yellowish brown and is friable and firm; the next part is a yellowish brown, very firm, brittle fragipan; and the lower part is strong brown and firm. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm loam. In some areas the slope is 0 to 2 percent or 6 to 9 percent. In other areas the soil is eroded.

Included with this soil in mapping are small areas of well drained soils that do not have a fragipan. These soils are in the same landscape positions as the Homewood soil. Also included are small areas of somewhat poorly drained soils on concave slopes. Included soils make up about 15 percent of most areas.

Permeability is moderate above the fragipan in the Homewood soil and slow in and below the fragipan. Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is at a depth of 30 to 48 inches during extended wet periods. Water moves laterally along the top of the fragipan and occasionally surfaces as seeps. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is well suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is moderate. A surface crust forms after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including hay and cover crops in the crop rotation, returning crop residue to the soil, and establishing grassed waterways help to control erosion and minimize crusting. Natural drainage generally is adequate for most crops, but random subsurface drains may be needed to remove excess water in some of the wetter included areas.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

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

This soil is only moderately suited to building site development and is poorly suited to septic tank absorption fields because of the seasonal wetness and the slow permeability. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields intercept lateral seepage and lower the seasonal high water table. Enlarging the absorption area and installing the distribution lines in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

HoC2—Homewood silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained and well drained soil is on ridgetops, knolls, dissected side slopes, and foot slopes on Illinoian till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 500 feet long. Most areas are irregularly shaped and are 5 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 46 inches thick. The upper part is yellowish brown, firm silty clay loam and clay loam, and the lower part is a fragipan of yellowish brown, mottled, very firm, brittle clay loam. The substratum to a depth of about 60 inches is yellowish brown, firm clay loam. In some areas the soil is only slightly eroded. In other areas the substratum is stratified sandy loam and silt loam.

Included with this soil in mapping are small areas of Hickory soils. These soils do not have a fragipan. They are in the same landscape positions as the Homewood soil. Also included are small areas of the somewhat poorly drained Orrville soils on narrow flood plains and a few seeps and springs. Inclusions make up about 15 percent of most areas.

Permeability is moderate above the fragipan in the Homewood soil and slow in and below the fragipan. Available water capacity is moderate. Runoff is rapid in cultivated areas. The seasonal high water table is at a depth of 30 to 48 inches during extended wet periods. Water moves laterally along the top of the fragipan and occasionally surfaces as seeps. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain grown in rotation with meadow crops. Erosion is a severe hazard in tilled areas. It has reduced the level of natural fertility and increased the

need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, and contour stripcropping help to control erosion and minimize crusting. Grassed waterways also help to control erosion. In many areas slopes are long and uniform and therefore are well suited to contour stripcropping. Natural drainage is adequate for most crops, but random subsurface drains are needed in the included areas of seeps and springs.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

Because of the slope, the seasonal wetness, and the slow permeability, this soil is only moderately suited to building site development and is poorly suited to septic tank absorption fields. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table and intercept lateral seepage along the top of the fragipan. Enlarging the absorption area and installing the distribution lines on the contour and in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

HoD2—Homewood silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, moderately well drained and well drained soil is on dissected side slopes and foot slopes on Illinoian till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 100 to 400 feet long. Most areas are long and narrow and are 4 to 25 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is yellowish brown clay loam about 49 inches thick. The upper part is firm; the next part is a mottled, very firm, brittle fragipan; and the lower part is firm. The substratum to a depth of about 60 inches is yellowish brown, firm loam. In a few places the soil is less eroded.

Included with this soil in mapping are small areas of Hickory soils. These soils do not have a fragipan. They are in the same landscape positions as the Homewood soil. Also included are narrow strips of the somewhat poorly drained Orrville soils on narrow flood plains; some springs and seeps; and, on the upper part of the slopes, areas of severely eroded soils that have a surface layer of clay loam. Tilth is fair in the severely eroded soils. Inclusions make up about 15 percent of most areas.

Permeability is moderate above the fragipan in the Homewood soil and slow in and below the fragipan. Available water capacity is moderate. Runoff is very rapid in cultivated areas. The seasonal high water table is at a depth of 30 to 48 inches during extended wet periods. Water moves laterally along the top of the fragipan and occasionally surfaces as seeps. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are used as pasture, woodland, or hayland. Some areas are used for row crops or small grain.

Because of a very severe hazard of erosion in tilled areas, this soil is poorly suited to cultivated crops. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, and contour stripcropping help to control erosion and minimize crusting. Natural drainage is adequate for most crops, but random subsurface drains may be needed to remove excess water in the included areas of seeps and springs.

This soil is moderately suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion. On south aspects, the seedling mortality rate can be reduced by planting seedlings that have been transplanted once.

This soil is poorly suited to building site development

and septic tank absorption fields because of the slope, the seasonal wetness, and the slow permeability. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table and intercept lateral seepage along the top of the fragipan. Enlarging the absorption area and installing the distribution lines on the contour and in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

HoE2—Homewood silt loam, 18 to 25 percent slopes, eroded. This deep, steep, moderately well drained and well drained soil is on dissected side slopes along drainageways on Illinoian till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 75 to 250 feet long. Most areas are long and narrow and are 5 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is clay loam about 50 inches thick. The upper part is yellowish brown and firm; the next part is a yellowish brown, mottled, very firm, brittle fragipan; and the lower part is dark yellowish brown and firm. The substratum to a depth of about 60 inches is yellowish brown, firm clay loam. In some areas the slope is more than 25 percent.

Included with this soil in mapping are small areas of soils that do not have a fragipan. These soils are in the same landscape positions as the Homewood soil. Also included are strips of the somewhat poorly drained Orrville soils on narrow flood plains; some springs and seeps; and, on the upper part of the slopes, areas of severely eroded soils that have a surface layer of clay loam. Tilth is fair in the severely eroded soils. Inclusions make up about 15 percent of most areas.

Permeability is moderate above the fragipan in the Homewood soil and slow in and below the fragipan. Available water capacity is moderate. Runoff is very rapid. The seasonal high water table is at a depth of 30 to 48 inches during extended wet periods. Water moves laterally along the top of the fragipan and occasionally surfaces as seeps. Tilth is good. The root zone generally is moderately deep. It commonly is restricted to the part of the profile above the compact fragipan.

Most areas are wooded. Some areas are used as pasture. A few areas are used for row crops, small grain, or hay.

Because of the slope and a very severe hazard of erosion, this soil generally is unsuited to cultivated crops, is only moderately suited to pasture, and is poorly suited to hay. If properly managed, however, it is well suited to grazing in winter and early in spring. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. On south aspects, the seedling mortality rate can be reduced by planting seedlings that have been transplanted once.

This soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields because of the slope, the seasonal wetness, and the slow permeability. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Septic tank absorption fields should be installed on the better suited adjacent soils. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

KeB—Keene silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on unglaciated ridgetops. Most areas are long and narrow and are 3 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 36 inches thick. The upper part is yellowish brown, friable silt loam and silty clay loam, and the lower part is yellowish brown, mottled, firm silty clay loam and silty clay. The substratum is yellowish brown, mottled, firm silty clay. Soft shale bedrock is at a depth of about 55 inches. In some areas the upper part of the soil has a higher content of sand and coarse fragments. In a few places the slope is 6 to 9 percent.

Included with this soil in mapping are small areas of the well drained Alford soils. These soils are in landscape positions similar to those of the Keene soil. They make up about 15 percent of most areas.

Permeability is moderate or moderately slow in the upper part of the subsoil in the Keene soil and slow or moderately slow in the lower part and in the substratum.

Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used as cropland. Some areas are used for hay, pasture, or woodland or are covered with brush.

This soil is well suited to corn and small grain. In tilled areas erosion is a moderate hazard. A surface crust forms after hard rains. Including grasses and legumes in the crop rotation, returning crop residue to the soil, and applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting. Contour farming also helps to control erosion.

This soil is well suited to hay and pasture. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is moderate. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

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

Because of the seasonal wetness and a moderate shrink-swell potential, this soil is only moderately suited to building site development. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is poorly suited to septic tank absorption fields because of the seasonal wetness and the slow or moderately slow permeability. Perimeter drains around the absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

KeC2—Keene silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is on unglaciated ridgetops. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 200 to 400 feet long. Most areas are long and narrow and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 48 inches thick. The upper part is yellowish brown, friable silt loam and silty clay loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The substratum is grayish brown, mottled, firm silty clay loam. Soft siltstone bedrock is at a depth of about 60 inches. In some areas the slope is 4 to 6 percent or 12 to 15 percent.

Included with this soil in mapping are small areas of the well drained Alford soils. These soils are in landscape positions similar to those of the Keene soil or are in the less sloping areas. Also included are small areas of the well drained Rigley soils on the higher parts of ridgetops, small areas of moderately deep soils and severely eroded soils on the upper part of the slopes, and some springs and seeps on the lower part of the slopes. Inclusions make up about 20 percent of most areas.

Permeability is moderate or moderately slow in the upper part of the subsoil in the Keene soil and slow or moderately slow in the lower part and in the substratum. Available water capacity is moderate. Runoff is rapid in tilled areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for pasture or hay. Some areas are used for row crops, small grain, or woodland or are covered with brush.

This soil is only moderately suited to corn and small grain because of the slope and a severe hazard of erosion. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. Contour stripcropping, crop rotations that include hay or cover crops, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting. The soil is only moderately suited to no-till farming because of the seasonal wetness. Seeps and springs interfere with tillage. Random subsurface drains are needed to remove excess water in areas around the seeps and springs.

This soil is well suited to hay and pasture. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

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

Because of the slope, the seasonal wetness, and a

moderate shrink-swell potential, this soil is only moderately suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is poorly suited to septic tank absorption fields because of the slope, the seasonal wetness, and the slow or moderately slow permeability. Perimeter drains around the absorption fields lower the seasonal high water table and intercept lateral seepage from the higher adjacent areas. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface.

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

KeD2—Keene silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, moderately well drained soil is on unglaciated hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and commonly are 300 to 600 feet long. Most areas are irregularly shaped and are 20 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 53 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is yellowish brown, mottled, firm silty clay loam. The substratum is grayish brown and yellowish brown, mottled, firm silty clay loam. Soft siltstone bedrock is at a depth of about 76 inches. In some areas the slope is 9 to 12 percent.

Included with this soil in mapping are areas of well drained soils that have a subsoil and substratum of silt loam. These soils are in the same landscape position as the Keene soil. Also included are small areas of moderately deep soils and severely eroded soils on the upper part of the slopes and some seeps and springs on the lower part. Inclusions make up about 20 percent of most areas.

Permeability is moderate or moderately slow in the upper part of the subsoil in the Keene soil and slow or moderately slow in the lower part and in the substratum. Available water capacity is moderate. Runoff is very rapid in tilled areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas formerly were used as cropland but now are used as woodland or are covered with brush. Some areas are used for pasture or hay. A few areas are used for row crops or small grain.

This soil is poorly suited to cultivated crops because of the slope and a very severe hazard of erosion. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. Crop rotations that include hay and cover crops and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting. Contour stripcropping and grassed waterways also help to control erosion. Seeps and springs interfere with tillage. Subsurface drains are needed to remove excess water in areas around the seeps and springs.

This soil is moderately suited to hay and pasture. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion.

Access roads to oil and gas wells are subject to severe gully erosion in areas of this soil. The hazard of erosion can be reduced by constructing the roads on the lowest possible grade and by establishing water bars.

This soil is poorly suited to building site development and septic tank absorption fields because of the slope, the seasonal wetness, the moderately slow or slow permeability, and a moderate shrink-swell potential. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields lower the seasonal high water table and intercept lateral seepage from the higher adjacent soils. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a

plant cover where possible on the construction site.

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

Kk—Killbuck silt loam, frequently flooded. This deep, nearly level, poorly drained soil is on flood plains. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 10 to 40 acres in size.

Typically, the surface layer is grayish brown, mottled, friable silt loam about 6 inches thick. The next 14 inches also is grayish brown, mottled, friable silt loam. Below this is a buried surface layer of black, firm silty clay loam about 8 inches thick. The buried subsoil is gray, mottled, firm silty clay loam about 24 inches thick. The substratum to a depth of about 60 inches is dark gray, mottled, firm silty clay loam. In some areas less than 15 inches or more than 36 inches of alluvium overlies the buried soil. In a few areas the soil does not have a buried surface layer. In places it is somewhat poorly drained.

Included with this soil in mapping are small areas of the very poorly drained Sloan and Wallkill soils. These soils are in the same landscape position as the Killbuck soil. Also included are the very poorly drained Luray soils along the edges of some mapped areas. Included soils make up about 15 percent of most areas.

Permeability is moderately slow in the Killbuck soil. Available water capacity is high. Runoff is very slow. The seasonal high water table is near the surface during extended wet periods. Tilth is good. The root zone commonly is restricted by the water table, but it is deep in drained areas.

Many areas, especially those that are undrained, are used for hay, pasture, or woodland. Some areas are used as cropland.

If drained, this soil is moderately suited to corn and soybeans. It generally is unsuited to small grain because of the flooding. The seasonal wetness and the flooding are the main management concerns. Establishing drainage outlets is difficult in some areas. In areas where suitable outlets are available, surface and subsurface drains can lower the seasonal high water table. Dikes protect a few areas from flooding. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage.

This soil is well suited to trees that can withstand wetness. Selecting species that can withstand wetness and flooding and planting seedlings that have been transplanted once reduce the seedling mortality rate. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow. Logging when the soil is frozen or during the drier parts of the year facilitates the use of equipment and minimizes compaction and the formation of ruts. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil generally is unsuited to building site development and septic tank absorption fields because of the flooding, the wetness, and the moderately slow permeability.

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

Lu—Luray silty clay loam. This deep, nearly level, very poorly drained soil is on flats and in depressions on Wisconsinan lake plains and on terraces along streams. It receives runoff from the higher adjacent soils and is subject to ponding. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 20 to 60 acres in size. A few areas are larger than 100 acres.

Typically, the surface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsurface layer is black, friable silty clay loam about 4 inches thick. The subsoil is about 28 inches of dark gray and dark grayish brown, mottled, firm silty clay loam and friable silt loam. The substratum to a depth of about 60 inches is dark grayish brown, mottled, friable silt loam. In some areas the substratum has strata of gravelly sandy loam or gravelly loamy sand. In other areas a thin layer of lighter colored recent alluvium is on the surface. In places the surface soil is 18 to 20 inches thick. In a few areas the subsoil contains more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Fitchville and moderately well drained Glenford soils. These soils are slightly higher on the landscape than the Luray soil. Also included, in some small depressions, are small areas of Carlisle soils, which formed in organic deposits. Included soils make up about 10 percent of most areas.

Permeability is moderately slow in the Luray soil. Available water capacity is high. Runoff is very slow or ponded. In undrained areas the seasonal high water table is near or above the surface during extended wet periods. Tilth is fair. Unless the soil is drained, the root zone is restricted by the water table.

Most areas are used for row crops or small grain. Some areas are used as pasture, woodland, or hayland. Most of the wooded areas are undrained.

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. It delays planting and limits the choice of crops that can

be grown. During a wet spring, the seasonal high water table restricts the root development of most crops in undrained areas. Moisture stress is a problem during a hot, dry summer. Harvesting activities can result in compaction and the formation of ruts in areas that are not adequately drained. The soil responds well to measures that improve drainage and prevent compaction. A surface and subsurface drainage system can be used to remove excess water. Fall tillage is less likely to cause compaction than spring tillage because the soil generally is drier in the fall. A tillage system that leaves the surface rough hastens drying.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The forage species that can withstand wetness should be selected for planting.

This soil is well suited to trees that can withstand wetness. Selecting species that can withstand wetness and planting seedlings that have been transplanted once reduce the seedling mortality rate. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow. Logging when the soil is frozen or during the drier parts of the year facilitates the use of equipment and minimizes compaction and the formation of ruts. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to building site development and septic tank absorption fields because of the ponding and the moderately slow permeability. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

McB—Mechanicsburg silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is in areas on glaciated ridgetops where a mantle of glacial till overlies fine grained sandstone or siltstone bedrock. Most areas are irregularly shaped and are 10 to 25 acres in size. Some areas are as large as 60 acres.

Typically, the surface layer is brown, friable silt loam about 8 inches thick. The subsoil is about 38 inches thick. The upper part is brown, friable silt loam and yellowish brown, friable silty clay loam; the next part is yellowish brown, firm clay loam; and the lower part is yellowish brown, firm channery loam. The substratum is yellowish brown, friable extremely channery loam. Thinly bedded, fractured siltstone or fine grained sandstone bedrock is at a depth of about 54 inches. In some areas the lower part of the subsoil is yellowish red. In other areas the slope is 6 to 9 percent. In places the soil is moderately well drained.

Included with this soil in mapping are areas of the well drained Amanda soils. These soils formed in 60 or more inches of glacial till. Also included are areas of the moderately deep, well drained Berks soils, which formed in material weathered from shale, siltstone, and sandstone. The included soils are in the same landscape positions as the Mechanicsburg soil. They make up about 20 percent of most areas.

Permeability and available water capacity are moderate in the Mechanicsburg soil. Runoff is medium in tilled areas. Tilth is good. The root zone is deep.

Many areas are used as cropland, hayland, or pasture. Some areas are wooded or covered with brush.

This soil is well suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is moderate. The soil is somewhat droughty in the areas where it is shallowest over bedrock. It dries and warms early in the spring and thus is suited to tilling and planting early in spring. A surface crust forms in tilled areas after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including meadow crops in the crop rotation, and returning crop residue to the soil conserve moisture, help to control erosion, and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. If properly managed, it is well suited to grazing in winter and early in spring because of the good drainage. Alfalfa can be grown if lime is applied. No-till seeding helps to control erosion and conserves moisture.

This soil is well suited to trees. Seedlings grow well if good management is applied. No major hazards or limitations affect planting or harvesting.

This soil is well suited to building site development. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

Depending on the depth to bedrock, this soil is either poorly suited or moderately suited to septic tank absorption fields. Where the bedrock is near a depth of 40 inches, the filtration of effluent in the absorption fields is inadequate. Effluent that enters cracks in the underlying bedrock can move considerable distances

and pollute ground water. Installing the absorption field in suitable fill material can improve filtration. In areas where it is deep enough to provide adequate filtration, the soil is moderately suited to septic tank absorption fields. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Onsite investigation can determine the depth to bedrock.

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

McC2—Mechanicsburg silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on glaciated ridgetops and dissected side slopes. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are smooth and are 100 to 300 feet long. Most areas are irregularly shaped and are 5 to 20 acres in size. Some areas are as large as 70 acres.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 36 inches of yellowish brown, friable silty clay loam, clay loam, and channery loam. The substratum is yellowish brown, friable extremely channery silt loam. Thinly bedded, fractured siltstone and fine grained sandstone bedrock is at a depth of about 60 inches. In some areas the slope is 4 to 6 percent or 12 to 15 percent. In other areas the soil is moderately well drained. In places the lower part of the subsoil is yellowish red.

Included with this soil in mapping are small areas of Amanda and Brownsville soils. Brownsville soils are in the same landscape positions as the Mechanicsburg soil, and Amanda soils are in the same positions or in the lower positions. Amanda soils have fewer coarse fragments in the lower part than the Mechanicsburg soil, and Brownsville soils have a higher content of coarse fragments in the upper part. Also included are small areas of moderately deep soils and severely eroded soils on the upper part of the slopes. Included soils make up about 20 percent of most areas.

Permeability and available water capacity are moderate in the Mechanicsburg soil. Runoff is rapid in tilled areas. Tilth is good. The root zone is deep.

Many areas are used as cropland or pasture. Some areas are wooded or are covered with brush.

This soil is moderately suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is severe. The soil is somewhat droughty in the areas where it is shallowest over bedrock. It dries and warms early in spring and thus is suited to tilling and planting early in spring. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations, and contour stripcropping conserve moisture, help to control erosion, and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

This soil is only moderately suited to building site development because of the slope and a moderate shrink-swell potential. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

Depending on the depth to bedrock, this soil is either poorly suited or moderately suited to septic tank absorption fields. Where the bedrock is near a depth of 40 inches, the filtration of effluent in the absorption fields is inadequate. Effluent that enters cracks in the underlying bedrock can move considerable distances and pollute ground water. Installing the absorption field in suitable fill material can improve filtration. In areas where it is sufficiently deep for adequate filtration, the soil is moderately suited to septic tank absorption fields. Enlarging the absorption area improves the capacity of the fields to absorb effluent. Installing the distribution lines on the contour helps to prevent seepage of the effluent to the surface.

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

McD2—Mechanicsburg silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil is on glaciated hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are smooth and are 150 to 300 feet long. Most areas are winding and narrow and are 10 to 60 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 44 inches thick. It is yellowish brown. The upper part is friable silt loam and loam, and the lower part is friable channery loam and very channery silt loam. The substratum is brown, friable extremely channery silt loam. Fractured siltstone bedrock is at a depth of about 60 inches. In some areas the slope is more than 18 percent. In places the soil is moderately well drained.

Included with this soil in mapping are small areas of Amanda and Brownsville soils. Brownsville soils are in the same landscape positions as the Mechanicsburg soil, and Amanda soils are in the same positions or in the lower positions. Amanda soils have fewer coarse fragments in the lower part than the Mechanicsburg soil, and Brownsville soils have a higher content of coarse fragments in the upper part. Also included are small areas of moderately deep soils and severely eroded soils on the upper part of the slopes. Included soils make up about 20 percent of most areas.

Permeability and available water capacity are moderate in the Mechanicsburg soil. Runoff is very rapid in tilled areas. Tilth is good. The root zone is deep.

Most areas formerly were farmed, but many are reverting to woodland. Many areas are used as pasture. Some are used as cropland.

This soil is poorly suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is very severe. The soil is somewhat droughty in the areas where it is shallowest over bedrock. It dries and warms early in spring and thus is suited to tilling and planting early in spring. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include hay and cover crops, and contour stripcropping conserve moisture and help to control erosion. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is moderately suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a very severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion.

Because of the slope and a moderate shrink-swell potential, this soil is poorly suited to building site development. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is poorly suited to septic tank absorption fields because of the slope and the depth to bedrock. Onsite investigation is needed to determine the depth to bedrock. Where the soil is shallowest over bedrock, the filtration of effluent typically is inadequate. Effluent that enters cracks in the underlying bedrock can move considerable distances and pollute ground water. Installing the absorption field in suitable fill material can improve filtration. In areas where the soil is deep enough to provide adequate filtration, enlarging the absorption area and installing the distribution lines on the contour improve the capacity of the fields to absorb effluent and help to prevent seepage of the effluent to the surface.

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

McE—Mechanicsburg silt loam, 18 to 25 percent slopes. This deep, steep, well drained soil is on glaciated hillsides. Slopes commonly are smooth and are 150 to 400 feet long. Areas generally range from 10 to 60 acres in size. Most are long and winding or are dendritic. A few are oval.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil is about 26 inches thick. It is brown, strong brown, and yellowish brown, friable silt loam, loam, and channery loam. The substratum is yellowish brown, friable very channery silt loam. Thinly bedded, fractured siltstone and fine grained sandstone bedrock is at a depth of about 60 inches.

Included with this soil in mapping are small areas of Amanda and Brownsville soils. Brownsville soils are in the same landscape positions as the Mechanicsburg soil, and Amanda soils are in the same positions or in the lower positions. Amanda soils have fewer coarse fragments in the lower part than the Mechanicsburg soil, and Brownsville soils have a higher content of coarse fragments in the upper part. Also included are areas of moderately deep soils on the upper part of the slopes. Included soils make up about 20 percent of most areas.

Permeability and available water capacity are moderate in the Mechanicsburg soil. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas formerly were farmed, but many are reverting to woodland. Many areas are used as pasture. Only a few are used as cropland.

This soil is generally unsuited to cultivated crops because of the slope and a very severe hazard of erosion. The slope limits the use of farming equipment.

Because of the slope and the hazard of erosion, this soil is only moderately suited to pasture and is poorly suited to hay. It is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. No-till seeding helps to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of

equipment and helps to control erosion.

This soil is poorly suited to building site development and is generally unsuited to septic tank absorption fields because of the slope, the depth to bedrock, and a moderate shrink-swell potential. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

Md—Medway silt loam, occasionally flooded. This deep, nearly level, moderately well drained soil is on narrow or broad flood plains. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 20 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 31 inches of yellowish brown, mottled, friable silt loam, silty clay loam, and loam. The substratum to a depth of about 60 inches is dark yellowish brown, mottled, friable gravelly sandy loam. In places the substratum is very gravelly sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Shoals and very poorly drained Sloan soils. These soils are slightly lower on the landscape than the Medway soil and in high water channels. Also included, especially near the major drainageways, are small areas of well drained soils that have a sandy subsoil. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Medway soil. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 18 to 36 inches during extended wet periods. Tilth is good, and the soil can be worked throughout a wide range of moisture content. The root zone is deep.

Most areas are used for row crops, small grain, hay, or pasture. Some areas are wooded.

This soil is well suited to corn, soybeans, and small grain. Flooding is the main hazard, especially in areas used for winter grain crops. Floodwater can wash out or bury seedlings with sediment, cut gullies, and carry away recently applied plant nutrients. Natural drainage is generally adequate for crops, but random subsurface drains are needed in the wetter included areas.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage.

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

Because of the flooding and the seasonal wetness, this soil is generally unsuited to building site development and septic tank absorption fields.

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

Me—Melvin silt loam, frequently flooded. This deep, nearly level, poorly drained soil is on flats and in depressions on flood plains. Slopes are 0 to 2 percent. Most areas are long and relatively narrow and are 10 to 30 acres in size. A few areas are more than 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsoil is gray, mottled, friable silt loam about 15 inches thick. The substratum to a depth of about 60 inches is gray, mottled, friable silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Algiers and Orrville soils. These soils are in the same landscape positions as the Melvin soil. Also included are areas of the somewhat poorly drained Fitchville soils in the slightly higher positions on slack-water terraces and lake plains. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Melvin soil. Available water capacity is high. Runoff is very slow or ponded. The seasonal high water table is near the surface during extended wet periods. Tilth is good. Unless the soil is drained, the root zone is restricted by the water table.

Many areas, especially those that are undrained, are used as hayland, pasture, or woodland or are covered with brush. Some areas are used for row crops.

If drained, this soil is moderately suited to corn and soybeans. It is generally unsuited to small grain because of the flooding. The seasonal wetness and the hazard of flooding are the main management concerns. Draining the soil is difficult in some areas. In areas where suitable outlets are available, surface and subsurface drains commonly are used to lower the seasonal high water table. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting. Tilling and harvesting at the optimum moisture content help to prevent excessive compaction.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet.

Deferment of grazing during wet periods helps to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage. The species that can withstand wetness should be selected for planting.

This soil is well suited to trees that can withstand wetness. The species that can withstand wetness and flooding should be selected for planting. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Logging when the soil is frozen or during the drier parts of the year facilitates the use of equipment and minimizes compaction and the formation of ruts. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Harvesting procedures that do not isolate the remaining trees or leave them widely spaced reduce the hazard of windthrow.

This soil is generally unsuited to building site development and septic tank absorption fields because of the flooding and the wetness.

The land capability classification is IIIw. The woodland ordination symbol is 6W.

MnA—Mentor silt loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on flats on Wisconsinan terraces and lake plains. Most areas are long and narrow and are 5 to 20 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 40 inches of yellowish brown, friable silt loam and silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, friable silt loam. In places the soil is moderately well drained. In some areas the lower part of the subsoil or the substratum is sandy loam or gravelly sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Fitchville soils in swales and slight depressions. These soils make up about 10 percent of most areas.

Permeability is moderate in the Mentor soil. Available water capacity is high. Runoff is slow. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used as hayland or pasture. Only a few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil, including meadow crops in the crop rotation, and applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface help to maintain tilth and minimize crusting.

This soil is well suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied.

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

This soil is well suited to building site development and septic tank absorption fields, but the slight seasonal wetness is a limitation. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains reduce the seasonal wetness in septic tank absorption fields. Properly landscaping building sites and absorption fields results in good surface drainage.

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

MnB—Mentor silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil generally is on low knolls and rises on Wisconsinan terraces along streams and on lake plains. In some areas it is on foot slopes. Most areas are 5 to 50 acres in size and are irregularly shaped.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 39 inches of yellowish brown, friable and firm silt loam. It is mottled below a depth of about 28 inches. The substratum to a depth of about 60 inches is yellowish brown, mottled, friable silt loam. In some areas the slope is 6 to 9 percent. In some places the soil is moderately well drained. In other places it has mixed siltstone and sandstone fragments throughout.

Included with this soil in mapping are small areas of the somewhat poorly drained Fitchville and very poorly drained Luray soils in shallow depressions and drainageways. Also included are small areas of Ockley and Chili soils, which contain more gravel in the lower part than the Mentor soil. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Mentor soil. Available water capacity is high. Runoff is medium. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. The hazard of erosion is moderate. A surface crust forms in tilled areas after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including meadow crops in the crop rotation, and returning crop residue to the soil help to control erosion and minimize

crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to pasture and hay. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied.

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

This soil is well suited to building site development and septic tank absorption fields, but the slight seasonal wetness is a limitation. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains reduce the seasonal wetness in septic tank absorption fields. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

MnC2—Mentor silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on dissected side slopes on Wisconsinan terraces along streams and on foot slopes at the base of the steeper hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are smooth and are 100 to 300 feet long. Most areas are long and narrow and are 5 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 39 inches thick. The upper part is brown, friable silt loam, and the lower part is yellowish brown, friable silt loam and firm silty clay loam. The substratum to a depth of about 60 inches is yellowish brown, friable, stratified silt loam and fine sandy loam. In some areas the slope is 4 to 6 percent or 12 to 16 percent. In other areas the soil is moderately well drained. In some places the subsoil or substratum is loam or clay loam. In other places the soil has mixed sandstone or siltstone fragments throughout.

Included with this soil in mapping are small areas of Chili soils. These soils are in landscape positions similar to those of the Mentor soil. They contain more gravel in the lower part than the Mentor soil. They make up about 15 percent of most areas.

Permeability is moderate in the Mentor soil. Available water capacity is high. Runoff is rapid. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used as cropland or pasture. Some areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, and contour stripcropping help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Alfalfa can be grown if lime is applied. No-till seeding helps to control erosion and conserves moisture.

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

Because of the slope and some seasonal wetness, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Installing interceptor drains upslope from the absorption fields reduces the seasonal wetness. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

MnD2—Mentor silt loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil is mainly on dissected side slopes on terraces along streams. In some areas it is on foot slopes at the base of the steeper hillsides, and in a few areas it is on dissected high terraces. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and are 100 to 300 feet long. Most areas are long and narrow and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 35 inches of yellowish brown, friable silt loam and firm silty clay loam. The substratum to a depth of about 60 inches is brown, friable silt loam and silty clay loam. In some areas the slope is 18 to 25 percent. In some places the soil is moderately well drained. In other places it has mixed sandstone and siltstone fragments throughout.

Included with this soil in mapping are small areas of Chili soils. These soils are in the same landscape positions as the Mentor soil. They contain more gravel in the lower part than the Mentor soil. They make up about 15 percent of most areas.

Permeability is moderate in the Mentor soil. Available water capacity is high. Runoff is very rapid. The seasonal high water table is at a depth of 48 to 72 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for hay or pasture. Some areas are used as cropland or woodland.

This soil is poorly suited to cultivated crops because of the slope and the hazard of erosion. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. In tilled areas the hazard of erosion is very severe. A surface crust forms after hard rains. Crop rotations that include grasses and legumes, cover crops, and no-till farming or another system of conservation tillage that leaves crop residue on the surface help to control erosion and minimize crusting.

This soil is moderately suited to hay and pasture. It is suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. Growing forage species helps to control erosion. If the pasture is plowed during seedbed preparation or is overgrazed, however, erosion is a very severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion.

Because of the slope and some seasonal wetness, this soil is poorly suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Installing interceptor drains upslope from the absorption fields reduces the seasonal wetness. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

MrE—Mertz very cherty silt loam, 18 to 35 percent slopes, very stony. This deep, steep and very steep, well drained soil is on unglaciated hillsides. Surface stones 10 to 24 inches long cover 0.1 to 3.0 percent of the surface. Slopes are generally short and uniform and are 70 to 200 feet long. Most areas are long, narrow, and winding and are 10 to 30 acres in size.

Typically, the surface layer is very dark grayish brown, friable very cherty silt loam about 2 inches thick. The subsurface layer is dark yellowish brown, friable very cherty silt loam about 3 inches thick. The subsoil is about 47 inches of strong brown and yellowish brown, friable very cherty, extremely cherty, and very channery silt loam. The substratum to a depth of about 60 inches is brown, friable extremely channery silty clay loam. In some areas the upper part of the subsoil has fewer coarse fragments.

Included with this soil in mapping are small areas of moderately deep soils on the upper part of the slopes. These soils make up about 20 percent of most areas.

Permeability is moderately slow in the Mertz soil. Available water capacity is low. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are wooded. Because of the slope, a very severe hazard of erosion, the stoniness, and droughtiness, this soil is generally unsuited to cultivated crops and pasture. It is well suited to woodland. The slope, the surface stoniness, and the high content of chert fragments throughout the soil are the main limitations in the wooded areas. Building logging roads and skid trails on the contour facilitates the use of equipment. The seedling mortality rate can be reduced by mulching or by planting seedlings that have been transplanted once. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to building site development and is generally unsuited to septic tank absorption fields because of the slope and the moderately slow permeability. Buildings should be designed so that they conform to the natural slope of the land. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

NeC2—Negley loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is mainly on dissected side slopes on Illinoian outwash terraces and kames. In a few areas it is on knolls on Illinoian till plains. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are 100 to 300 feet long. Most areas are 5 to 25 acres in size.

Typically, the surface layer is brown, friable loam about 7 inches thick. The subsoil to a depth of about 60 inches is strong brown and yellowish red, friable clay loam, loam, and gravelly clay loam. In some areas the slope is 12 to 15 percent. In a few areas it is 2 to 6 percent.

Included with this soil in mapping are small areas of Homewood and Parke soils. These soils are in landscape positions similar to those of the Negley soil.

Homewood soils have a fragipan. Parke soils have a lower content of sand and coarse fragments in the upper part than the Negley soil. Also included are narrow strips of severely eroded soils on the upper part of the slopes. Included soils make up about 15 percent of most areas.

Permeability is moderate or moderately rapid in the Negley soil. Available water capacity is moderate. Runoff is rapid. Tilth is good.

Most areas are used as cropland or pasture. A few areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, and contour stripcropping help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Because of the good drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

Because of the slope, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

This soil is a probable source of sand and gravel.

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

NeD2—Negley loam, 12 to 18 percent slopes, eroded. This deep, moderately steep, well drained soil is on dissected side slopes on Illinoian outwash terraces and on kames. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are 100 to 300 feet long. Most areas are irregularly shaped and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable loam about 6 inches thick. The subsoil to a depth of about 80 inches is yellowish brown, strong brown, and yellowish red, friable loam, clay loam, and gravelly clay loam. It is mottled below a depth of about 75 inches. In some areas the slope is 9 to 12 percent or 18 to 21 percent.

Included with this soil in mapping are small areas of Homewood and Parke soils. These soils are in landscape positions similar to those of the Negley soil. Homewood soils have a fragipan. Parke soils have a lower content of sand and coarse fragments in the upper part than the Negley soil. Also included are narrow strips of severely eroded soils on the upper part of the slopes. Included soils make up about 15 percent of most areas.

Permeability is moderate or moderately rapid in the Negley soil. Available water capacity is moderate. Runoff is very rapid in tilled areas. Tilth is good. The root zone is deep.

Most areas are used as permanent pasture or are wooded. Some areas are used as cropland.

This soil is poorly suited to corn, soybeans, and small grain because of the slope and a very severe hazard of erosion. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. In tilled areas the hazard of erosion is very severe. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, contour stripcropping, and grassed waterways help to control erosion.

This soil is moderately suited to pasture and hay. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied. If the pasture is plowed during seedbed preparation or is overgrazed, erosion is a very severe hazard. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion.

Because of the slope, this soil is poorly suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

NeE—Negley loam, 18 to 25 percent slopes. This deep, steep, well drained soil is on dissected side

slopes on Illinoian outwash terraces. Slopes are uniform and commonly are 200 to 350 feet long. Most areas are long and winding and are 5 to 25 acres in size.

Typically, the surface layer is brown, friable loam about 7 inches thick. The subsoil to a depth of about 60 inches is dark brown and strong brown, friable loam and gravelly clay loam. In some areas the slope is 15 to 18 percent or 26 to 30 percent. In other areas the surface layer is silt loam.

Included with this soil in mapping are small areas of Homewood soils. These soils are in landscape positions similar to those of the Negley soil. They have a fragipan. Also included are narrow strips of severely eroded soils on the upper part of the slopes. Included soils make up about 15 percent of most areas.

Permeability is moderate or moderately rapid in the Negley soil. Available water capacity is moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are wooded. Some areas are used as permanent pasture. Only a few areas are used as cropland.

This soil is generally unsuited to row crops because of the slope and a very severe hazard of erosion. The slope limits the use of farming equipment.

Because of the slope, this soil is only moderately suited to pasture and is poorly suited to hay. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. No-till seeding helps to control erosion.

This soil is well suited to trees. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion.

Because of the slope, this soil is poorly suited to building site development and is generally unsuited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

NeF—Negley loam, 25 to 70 percent slopes. This deep, very steep, well drained soil is on dissected side slopes on Illinoian outwash terraces. Slopes commonly are 150 to 300 feet long. Most areas are long and winding and are 5 to 40 acres in size.

Typically, the surface layer is brown, friable loam about 6 inches thick. The subsoil extends to a depth of about 60 inches. It is brown, friable loam in the upper part and strong brown, friable gravelly sandy clay loam, gravelly loam, and gravelly sandy loam in the lower part. In some areas the surface layer is silt loam.

Included with this soil in mapping are small areas of Homewood soils. These soils are in landscape positions similar to those of the Negley soil. They have a fragipan. Also included are severely eroded soils on the upper part of the slopes. Included soils make up about 15 percent of most areas.

Most areas are wooded. A few areas are used as permanent pasture.

Permeability is moderate or moderately rapid in the Negley soil. Available water capacity is moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Because of the slope and a very severe hazard of erosion, this soil is generally unsuited to row crops, small grain, and hay and is poorly suited to pasture. The slope limits the use of most farm machinery. Unless an adequate plant cover is maintained, the hazard of erosion is very severe. No-till seeding helps to control erosion in pastured areas.

This soil is well suited to trees, but the hazard of erosion is very severe unless an adequate ground cover is maintained. Building logging roads and skid trails on the contour facilitates the use of equipment and helps to control erosion. Water bars and a good plant cover also help to control erosion.

This soil is generally unsuited to building site development and septic tank absorption fields because of the slope.

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

OcA—Ockley silt loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on flats on Wisconsinan outwash terraces. Areas commonly are irregularly shaped and are 20 to 60 acres in size. A few areas are more than 200 acres in size.

Typically, the surface layer is brown, very friable silt loam about 10 inches thick. The subsoil is about 46 inches thick. The upper part is yellowish brown and brown, friable silt loam and firm silty clay loam and clay loam, and the lower part is brown and dark yellowish brown, friable sandy clay loam and gravelly clay loam. The substratum to a depth of about 80 inches is brown, calcareous, loose very gravelly sand. In some areas the slope is 2 to 4 percent. In places the surface layer is gravelly silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Sleeth and very poorly drained Westland soils and small areas of Fox soils. Sleeth and Westland soils are in depressions and along small drainageways. Fox soils are intermingled with

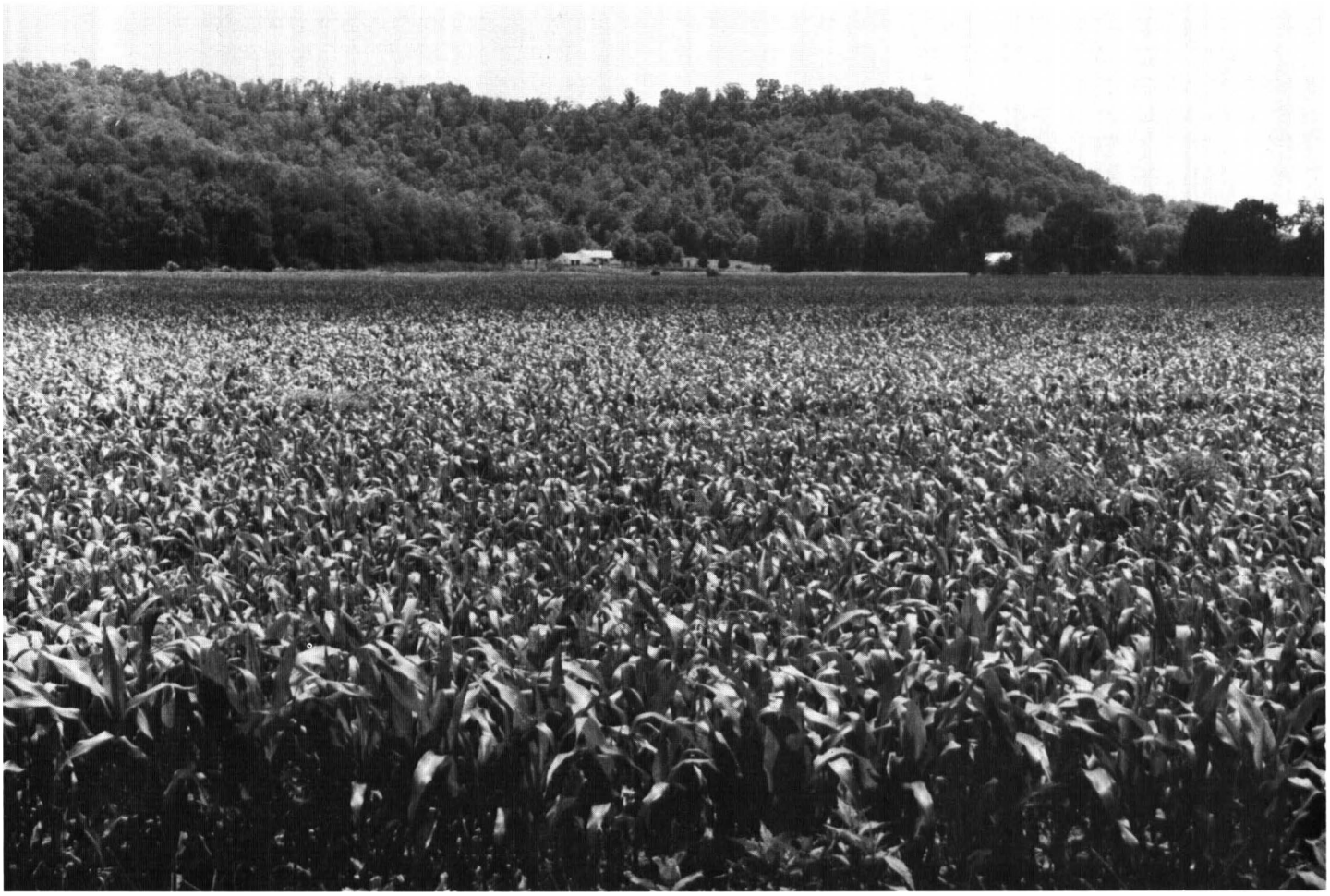

Figure 14.—An area of Ockley silt loam, 0 to 2 percent slopes, used for corn. Brownsville soils are on the wooded hillside in the background.

areas of the Ockley soil. Their subsoil is thinner than that of the Ockley soil. Also included are small areas of soils in which the substratum is silty clay, gravelly loam, gravelly sandy loam, or loam. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Ockley soil and very rapid in the substratum. Available water capacity is moderate. Runoff is slow. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used as hayland or pasture. Because of the suitability of this soil for cropland, only a few areas are wooded.

This soil is well suited to corn, soybeans, and small grain (fig. 14). Either conventional tillage methods or a system of conservation tillage that leaves crop residue on the surface can be used. The soil warms and dries early in spring and thus is well suited to tilling and planting early in spring. A surface crust forms in tilled areas after heavy rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface or returning crop residue to the soil minimizes crusting and helps to maintain tilth.

This soil is well suited to pasture and hay. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied.

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

This soil is well suited to building site development and septic tank absorption fields. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Sloughing is a hazard in shallow excavations.

This soil is a probable source of sand and gravel.

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

OcB—Ockley silt loam, 2 to 6 percent slopes. This deep, gently sloping, well drained soil is on rises and low knolls on Wisconsinan outwash terraces. Most areas are irregularly shaped and are 15 to 40 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 42 inches thick. The upper part is dark yellowish brown and strong brown, friable clay loam, and the lower part is brown and dark yellowish brown, friable gravelly sandy clay loam. The substratum to a depth of about 80 inches is yellowish brown, calcareous, loose very gravelly loamy sand. In some areas the slope is 0 to 2 percent or 6 to 9 percent. In places the surface layer is gravelly silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Sleeth and very poorly drained Westland soils in depressions and along small drainageways and small areas of Fox soils, which are moderately deep to sand and gravel. Fox soils are intermingled with areas of the Ockley soil. Also included are areas of soils in which the substratum is gravelly loam, gravelly sandy loam, or loam. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Ockley soil and very rapid in the substratum. Available water capacity is moderate. Runoff is medium. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. Because of the suitability of this soil for cropland, only a few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. The soil warms and dries early in spring and thus is well suited to tilling and planting early in spring. A surface crust forms after heavy rains. The hazard of erosion is moderate in tilled areas. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including grasses and legumes in the crop rotation, and returning crop residue to the soil help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime is applied.

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

This soil is well suited to building site development and septic tank absorption fields. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site. Sloughing is a hazard in shallow excavations.

This soil is a probable source of sand and gravel.

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

OcC2—Ockley silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is mainly on dissected side slopes on Wisconsinan outwash terraces. In some areas it is on kames. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes commonly are 50 to 250 feet long. Most areas are long and narrow and are 3 to 25 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. The subsoil is about 44 inches thick. The upper part is brown, firm clay loam, and the lower part is brown, friable gravelly clay loam. The substratum to a depth of about 60 inches is brown, loose gravelly sand. In places the slope is 12 to 14 percent. In some areas the surface layer is gravelly silt loam.

Included with this soil in mapping are small areas of Fox soils, especially on the steeper part of the slopes, and areas of soils in which the substratum is loam or gravelly sandy loam. Fox soils have a subsoil that is thinner than that of the Ockley soil. Also included, on the upper part of the slopes, are small areas of severely eroded soils that have a surface layer of gravelly clay loam. Tilth is poor in the severely eroded soils. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Ockley soil and very rapid in the substratum. Available water capacity is moderate. Runoff is rapid. Tilth is good. The root zone is deep.

Most areas are used as cropland or pasture. A few areas are wooded.

This soil is moderately suited to corn, soybeans, and small grain. A surface crust forms after hard rains. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, increasing the need for lime and fertilizer. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations, and cover crops help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to conservation tillage, including no-till farming.

This soil is well suited to hay and pasture. It is well suited to alfalfa. If properly managed, it is well suited to

grazing in winter and early in spring because of the good natural drainage. No-till seeding helps to control erosion and conserves moisture.

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

Because of the slope and a moderate shrink-swell potential, this soil is moderately suited to building site development and septic tank absorption fields. 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 helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site. Sloughing is a hazard in shallow excavations.

This soil is a probable source of sand and gravel.

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

OeA—Ockley-Urban land complex, 0 to 3 percent slopes. This map unit consists of a deep, nearly level, well drained Ockley soil and areas of Urban land on flats on Wisconsinan outwash terraces. Slopes are dominantly less than 2 percent. Areas are narrow or broad and are 10 to more than 1,000 acres in size. Most are about 45 percent Ockley silt loam and 35 percent Urban land. The Ockley soil and Urban land occur as areas so intricately mixed that separating them in mapping was not practical.

Typically, the Ockley soil has a surface layer of brown, very friable silt loam about 10 inches thick. The subsoil is about 46 inches thick. The upper part is yellowish brown and brown, friable silt loam and firm silty clay loam and clay loam, and the lower part is brown and dark yellowish brown, friable sandy clay loam and gravelly clay loam. The substratum to a depth of about 80 inches is brown, calcareous, loose very gravelly sand. Some low areas have been filled or leveled during construction, and other small areas have been built up or smoothed. In places the subsoil is silt loam.

The Urban land is covered by buildings and pavement. The buildings are mainly residential or commercial, but some are industrial.

Included with the Ockley soil and Urban land in mapping are small areas that have been radically altered by deep cutting and filling, narrow strips of the very poorly drained Westland and somewhat poorly drained Sleeth soils along drainageways and in depressions, and some small dumps. The excavated areas commonly have sand and gravel near the surface, but in filled areas the soil is considerably deeper to sand and gravel. Inclusions make up about 20 percent of most areas.

Permeability is moderate in the subsoil of the Ockley soil and very rapid in the substratum. Available water capacity is moderate. Runoff is slow. Tilth is good. The root zone is deep.

The Ockley soil is used for lawns, gardens, or parks. It is well suited to lawns, vegetable and flower gardens, trees, and shrubs. It generally is unsuited to water impoundments because of the very rapidly permeable substratum. Erosion generally is a concern only in disturbed areas where the surface is not protected. The included areas that have been cut and filled are not well suited to lawns and gardens. Tilth is poor where the subsoil is exposed. The exposed material is sticky when wet and hard when dry. Adding organic material to the soil improves tilth.

The Ockley soil is well suited to building site development and septic tank absorption fields. Backfilling along foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Sloughing is a hazard in shallow excavations.

The Ockley soil and Urban land are not assigned a land capability classification or a woodland ordination symbol.

OeC—Ockley-Urban land complex, 6 to 12 percent slopes. This map unit consists of a deep, sloping, well drained Ockley soil and areas of Urban land. The unit generally is on dissected side slopes on Wisconsinan outwash terraces. In a few areas it is on knolls. Areas commonly occur as long, narrow bands that are 10 to 30 acres in size. Most are about 45 percent Ockley silt loam and 35 percent Urban land. The Ockley soil and Urban land occur as areas so intricately mixed that separating them in mapping was not practical.

Typically, the Ockley soil has a surface layer of brown, friable silt loam about 6 inches thick. The subsoil is about 44 inches thick. The upper part is brown, firm clay loam, and the lower part is brown, friable gravelly clay loam. The substratum to a depth of about 60 inches is brown, calcareous, loose gravelly sand. In some areas the slope is 12 to 18 percent. Some low areas have been filled or leveled during construction, and other areas have been built up or smoothed.

The Urban land is covered by buildings and pavement. The buildings are mainly residential or commercial, but some are industrial.

Included with the Ockley soil and Urban land in mapping are small areas of Fox soils. These soils are in the steeper areas. Their subsoil is thinner than that of the Ockley soil. Also included are areas that have been

radically altered by deep cutting and filling. The excavated areas commonly have sand and gravel near the surface, but in the filled areas the soil commonly is deeper to sand and gravel. Inclusions make up about 20 percent of most areas.

Permeability is moderate in the subsoil of the Ockley soil and very rapid in the substratum. Available water capacity is moderate. Runoff is rapid. Tilth is good. The root zone is deep.

The Ockley soil is used for lawns or gardens. It is well suited to trees and shrubs. It is only moderately suited to lawns and to vegetable and flower gardens because of the slope. It is poorly suited to water impoundments because of the very rapidly permeable substratum and the hazard of seepage. The included areas that have been cut and filled are not well suited to lawns and gardens. Tilth is poor where the subsoil is exposed. The exposed material is sticky when wet and hard when dry. Adding organic material to the soil improves tilth.

The Ockley soil is only moderately suited to building site development and septic tank absorption fields because of the slope and a moderate shrink-swell potential. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site. Sloughing is a hazard in shallow excavations.

The Ockley soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

Or—Orrville silt loam, occasionally flooded. This deep, nearly level, somewhat poorly drained soil is on flood plains. Slopes are 0 to 2 percent. Most areas are long and narrow and are 4 to 50 acres in size. Some areas are about 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsoil is about 30 inches thick. The upper part is dark gray and brown, mottled, friable silt loam, and the lower part is yellowish brown and brown, mottled, friable loam. The substratum to a depth of about 60 inches is brown, mottled, very friable sandy loam and dark yellowish brown, very friable loamy sand. In places the surface layer is loam or fine sandy loam.

Included with this soil in mapping are small areas of the well drained Tioga soils. These soils are slightly higher on the landscape than the Orrville soil. Also included are areas of poorly drained soils in high water channels and depressions. Included soils make up about 20 percent of most areas.

Permeability is moderate in the Orrville soil. Available water capacity is moderate or high. Runoff is very slow. Tilth is good. The seasonal high water table is at a depth of 12 to 30 inches during extended wet periods. In drained areas the root zone is deep.

The use of this soil is determined to a large extent by the size and accessibility of individual areas. Many of the wider areas are used for row crops or hay. The narrow, inaccessible, or dissected areas are used mainly as pasture or woodland or are covered with brush.

If drained, this soil is well suited to corn and soybeans. Because of the flooding, it is not so well suited to winter wheat and oats. The flooding and the seasonal wetness are the major management concerns. Subsurface drains can be used to lower the seasonal high water table in areas where suitable outlets are available. Open ditches are needed to provide outlets in some areas. Water is likely to back up into subsurface drains when water levels are high in the stream channels. Floodwater causes gullying, washes out subsurface drains, buries seedlings, and carries away recently applied plant nutrients.

This soil is well suited to hay and pasture. Because of the seasonal wetness, it is better suited to grasses than to legumes. Most undrained areas are too wet for deep-rooted legumes. The plants grow well through the dry part of the summer. Grazing when the soil is too wet causes compaction and poor tilth. Deferment of grazing during wet periods helps to keep the pasture in good condition. The deposition of sediments caused by floodwater reduces the quality of the forage.

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

This soil is generally unsuited to building site development and septic tank absorption fields because of the seasonal wetness and the hazard of flooding.

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

PaC2—Parke silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, well drained soil is on dissected side slopes on Illinoian outwash terraces. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth and typically are 100 to 300 feet long. Most areas are long and narrow and are 10 to 50 acres in size.

Typically, the surface layer is brown, friable silt loam about 7 inches thick. The subsoil extends to a depth of

about 60 inches. It is strong brown, friable silty clay loam and silt loam in the upper part and strong brown and reddish brown, friable loam and very gravelly sandy loam in the lower part. In some areas the layers of silt loam and silty clay loam are thicker. In places the slope is 4 to 6 percent or 12 to 15 percent.

Included with this soil in mapping are areas of Negley soils. These soils are in the same landscape positions as the Parke soil or are in the steeper areas. They have a higher content of sand and coarse fragments in the upper part than the Parke soil. They make up about 15 percent of most areas.

Permeability is moderate in the Parke soil. Available water capacity is high. Runoff is rapid. Tilth is good.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. A few areas are wooded or are used for the production of nursery stock.

This soil is moderately suited to corn, soybeans, and small grain. It warms early in the spring and thus is well suited to tilling and planting early in spring. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations, and contour stripcropping help to control erosion and minimize crusting. Grassed waterways also help to control erosion. The soil is well suited to no-till farming.

This soil is well suited to hay and pasture. Because of the good natural drainage, it is well suited to grazing in winter and early in spring. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. Seeding a cover or companion crop, mulching, and no-till seeding help to control erosion.

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

Because of the slope and a moderate shrink-swell potential, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

Pe—Pewamo silty clay loam. This deep, nearly level, very poorly drained soil is on broad flats, in depressions, and in small upland drainageways on Wisconsinan till plains. It receives runoff from the higher adjacent soils and is subject to ponding. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 4 to 40 acres in size. Some areas are more than 100 acres in size.

Typically, the surface soil is very dark grayish brown, firm silty clay loam about 12 inches thick. It is mottled below a depth of about 8 inches. The subsoil to a depth of about 60 inches is multicolored, firm silty clay loam. In some areas the surface layer is silt loam. In other areas the dark surface soil is thicker. In some places light colored sediments from the adjacent slopes overlie the dark surface soil. In other places the subsoil or substratum is loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Bennington and moderately well drained Centerburg soils on slight rises and low knolls. Also included are small areas of the poorly drained Condit soils in landscape positions similar to those of the Pewamo soil. Included soils make up about 15 percent of most areas.

Permeability is moderately slow in the Pewamo soil. Available water capacity is high. Runoff is very slow or ponded. The seasonal high water table is near or above the surface during extended wet periods. Tilth is fair. The root zone is deep in drained areas.

Most areas are used as cropland. Some areas are used as pasture or woodland. Most of the wooded areas are not drained.

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. It delays planting and restricts the choice of crops that can be grown. In undrained areas the wetness limits the root development of most crops. The soil responds well to measures that improve drainage and minimize compaction. A surface and subsurface drainage system can help to remove excess water in areas where suitable outlets are available. Many areas do not have natural outlets. Draining closed depressions commonly is difficult. Fall tillage is less likely to cause compaction than spring tillage because the soil is generally drier in the fall. A tillage system that leaves the surface rough hastens drying. Tilling or harvesting when the soil is wet causes compaction and the formation of ruts.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The species that can withstand wetness, such as alsike clover, should be selected for planting.

This soil is well suited to trees that can withstand wetness. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Logging during the drier parts of the year or when the soil is frozen minimizes compaction and the formation of ruts and facilitates the use of equipment. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow.

This soil is poorly suited to building site development and septic tank absorption fields because of the ponding and the moderately slow permeability. Properly landscaping building sites and absorption fields results in good surface drainage. Natural drainage outlets are not available in many areas. Open ditches and surface drains commonly are used as outlets. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential and reinforcing walls and foundations help to prevent the structural damage caused by shrinking and swelling. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

Pf—Pewamo-Urban land complex. This map unit consists of a deep, nearly level, very poorly drained Pewamo soil and Urban land on broad flats, in depressions, and along drainageways. The Pewamo soil receives runoff from the higher adjacent areas and is subject to ponding. Slopes are 0 to 2 percent. Most areas are long and narrow or irregularly shaped and are 5 to 30 acres in size. They are about 50 percent Pewamo silty clay loam and 30 percent Urban land. The Pewamo soil and Urban land occur in areas so intricately mixed or so small that separating them in mapping was not practical.

Typically, the Pewamo soil has a surface layer of very dark grayish brown, firm silty clay loam about 12 inches thick. The subsoil to a depth of about 60 inches is multicolored, firm silty clay loam. In places the soil has been covered with fill material.

The Urban land is covered by buildings and pavement. The buildings are mainly single-family houses or apartment buildings, but some are industrial or commercial.

Included with the Pewamo soil and Urban land in mapping are small areas of the somewhat poorly drained Bennington soils on flats and small areas of the moderately well drained Centerburg soils on low knolls and ridges. Included soils make up about 20 percent of most areas.

Most areas have been drained by sewer systems, gutters, and storm drains. In undrained areas the Pewamo soil has a seasonal high water table near or above the surface during extended wet periods. Runoff is very slow or ponded on this soil. Permeability is moderately slow. Available water capacity is high. Tilth is fair.

The Pewamo soil is used for lawns or gardens. If drained, it is well suited to vegetables, flowers, trees, and shrubs. Water-tolerant plants grow in undrained areas. Filled areas are not well suited to lawns and gardens. Tilth is very poor in areas where the subsoil is exposed.

The Pewamo soil is poorly suited to building site development and septic tank absorption fields because of the moderately slow permeability and the ponding. Drainage is required in areas used for these purposes. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. In some areas sanitary facilities are connected to sewers and sewage treatment facilities. Perimeter drains around the absorption fields can lower the seasonal high water table in areas where suitable outlets are available. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

The Pewamo soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

Pg—Pits, gravel. This map unit consists of open excavations in areas where sand and gravel have been surface mined. Most of the pits are on Illinoian and Wisconsinan outwash terraces in areas associated with Chili, Fox, Negley, Ockley, and Rush soils. Some are on kames or moraines in areas associated with Amanda, Chili, Fox, Negley, and Ockley soils, and some are along stream channels or on flood plains. Typically, slopes are very irregular because of spoil piles, overburden, and unmined banks. Water fills some of the excavations, creating ponds that vary in size and depth. The pits generally are 10 to 60 acres in size, but they range from 2 to more than 100 acres.

Most of the larger pits are being mined. Many of the smaller ones have been abandoned. Once surface mining stops, the pits revert to weeds, grasses, and shrubs and drought-tolerant tree species eventually grow on the steep gravel banks, spoil piles, and

droughty pit bottoms. Plants that can withstand wetness commonly grow in areas of ponds.

The soil material in the gravel pits occurs as layers of sand and gravel that vary in thickness and composition within short distances. The physical properties of this material are poor. Available water capacity is very low. The suitability for plants is poor.

Because of the instability and loose consistency of the poorly graded sand and gravel, most areas are subject to erosion and are a potential source of sedimentation. Accelerated streambank erosion is a hazard along stream channels and on flood plains. Establishing a plant cover in abandoned areas helps to control erosion and minimizes sedimentation. The grasses and trees that can withstand drought and the other somewhat unfavorable soil properties should be selected for planting.

This map unit is not assigned a land capability classification or a woodland ordination symbol.

RgC—Rigley fine sandy loam, 6 to 12 percent slopes. This deep, sloping, well drained soil is on unglaciated ridgetops and knolls. Slopes are smooth and commonly are 100 to 300 feet long. Areas generally are 2 to 15 acres in size. Most of those on ridgetops are long and narrow. Those on knolls generally are oval.

Typically, the surface layer is brown, very friable fine sandy loam about 8 inches thick. The subsoil is yellowish brown, very friable sandy loam about 35 inches thick. The substratum to a depth of about 60 inches is brownish yellow, very friable channery sandy loam. In some areas the slope is 12 to 15 percent. In other areas the surface layer is stony. In places bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils on the lower part of the slopes and areas of soils that have a substratum of grayish brown, mottled, firm silty clay loam. Included soils make up about 15 percent of most areas.

Permeability is moderately rapid in the Rigley soil. Available water capacity is low or moderate. Runoff is rapid. Tilth is good. The root zone is deep.

Most areas are used as hayland or pasture. Some areas are used for woodland, row crops, or small grain or are covered with brush.

This soil is moderately suited to corn, soybeans, and small grain. A severe hazard of erosion, the slope, and droughtiness are the main management concerns. The soil dries and warms early in spring and thus is well suited to tilling and planting early in spring and to no-till farming. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, and contour stripcropping help to control erosion and conserve moisture. Grassed waterways also help to control erosion. Because of the moderately rapid permeability, frequent applications of a small amount of fertilizer and lime are more effective than one application of a large amount.

This soil is well suited to pasture and hay. If properly managed, it is well suited to grazing in winter and early in spring because of the good natural drainage. Alfalfa can be grown if lime and fertilizer are applied. Drought reduces yields of hay late in the growing season. Grasses grow poorly on unimproved pastures during dry periods. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. No-till seeding helps to control erosion and conserves moisture.

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

Because of the slope, this soil is only moderately suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

RgD—Rigley fine sandy loam, 12 to 18 percent slopes. This deep, moderately steep, well drained soil is on unglaciated hillsides, narrow ridgetops, and high knolls. Slopes commonly are 100 to 250 feet long. Most areas on hillsides and ridgetops are long and narrow and are 10 to 40 acres in size. Areas on knolls generally are oval and are 5 to 10 acres in size.

Typically, the surface layer is brown, very friable fine sandy loam about 8 inches thick. The subsoil is yellowish brown, very friable sandy loam about 32 inches thick. The substratum to a depth of about 60 inches is yellowish brown, very friable channery sandy loam. In some areas the slope is 9 to 12 percent or 18 to 21 percent. In other areas the surface layer is stony. In places bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils, especially on the lower or upper part of the slopes, and some small areas of rock outcrop on shoulder slopes. Inclusions make up about 20 percent of most areas.

Permeability is moderately rapid in the Rigley soil. Available water capacity is low or moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are used as hayland, pasture, or woodland or are covered with brush. Only a few areas are used for row crops or small grain.

Because of the slope, a very severe hazard of erosion, and droughtiness, this soil is poorly suited to cultivated crops. It dries and warms early in spring and thus is well suited to tilling and planting early in spring. No-till farming or another system of conservation tillage that leaves crop residue on the surface, cover crops, and contour stripcropping help to control erosion and conserve moisture. Grassed waterways also help to control erosion. The soil is well suited to conservation tillage systems, including no-till farming. Because of the moderately rapid permeability, frequent applications of a small amount of fertilizer are more effective than one application of a large amount.

This soil is moderately suited to pasture and hay. If properly managed, it is well suited to grazing in winter and early in spring. Alfalfa can be grown if lime and fertilizer are applied. Drought reduces yields of hay late in the growing season. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is very severe. No-till seeding helps to control erosion and conserves moisture.

This soil is well suited or moderately suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. The seedling mortality rate on south aspects can be reduced by planting seedlings that have been transplanted once or by mulching.

This soil is poorly suited to building site development and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface.

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

RgE—Rigley fine sandy loam, 18 to 25 percent slopes. This deep, steep, well drained soil is on unglaciated hillsides. Slopes commonly are 150 to 350 feet long. Most areas are long and narrow and are 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, very friable fine sandy loam about 3 inches thick. The subsurface layer is brown, very friable fine sandy loam about 5 inches thick. The subsoil is yellowish brown and brownish yellow, very friable sandy loam about 42 inches thick. The substratum to a depth of about 70 inches is brownish yellow, very friable channery sandy loam. In some areas the slope is 15 to 18 percent or 25 to 30 percent. In other areas the surface layer is stony. In places bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils, especially on the lower or upper part of the slopes, seeps on the lower part of some slopes, and small areas of rock outcrop on shoulder slopes. Inclusions make up about 20 percent of most areas.

Permeability is moderately rapid in the Rigley soil. Available water capacity is low or moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are used as pasture or woodland or are covered with brush. Because of the slope, a very severe hazard of erosion, and droughtiness, this soil generally is unsuited to row crops and small grain, is only moderately suited to pasture, and is poorly suited to hay. It is well suited to grazing in winter and early in spring. The slope limits the use of farming equipment. In most years drought reduces forage production late in summer. The hazard of erosion is very severe if the pasture is plowed during seedbed preparation or is overgrazed. No-till seeding helps to control erosion and conserves moisture.

This soil is well suited or moderately suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. The seedling mortality rate on south aspects can be reduced by planting seedlings that have been transplanted once or by mulching.

Because of the slope, this soil is poorly suited to building site development and generally is unsuited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

RgF—Rigley fine sandy loam, 25 to 35 percent slopes. This deep, very steep, well drained soil is on unglaciated hillsides. Slopes commonly are 150 to 300 feet long. Most areas are long and narrow and are 10 to 100 acres in size.

Typically, the surface layer is black, very friable fine sandy loam about 2 inches thick. The subsurface layer is brown, very friable fine sandy loam about 4 inches thick. The subsoil is about 37 inches thick. The upper part is brown and yellowish brown, very friable sandy loam, and the lower part is yellowish brown, very friable very channery sandy loam. The substratum to a depth

of about 60 inches is yellowish brown, very friable channery sandy loam. In some areas the slope is more than 35 percent. In other areas the surface layer is stony. In places bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of the moderately well drained Coshocton soils on the upper or lower part of the slopes, some seeps on the lower part of some slopes, and small areas of rock outcrop on shoulder slopes. Inclusions make up about 10 to 15 percent of most areas.

Permeability is moderately rapid in the Rigley soil. Available water capacity is low or moderate. Runoff is very rapid. Tilth is good. The root zone is deep.

Most areas are wooded or covered with brush. A few areas are used as permanent pasture.

Because of the slope, a very severe hazard of erosion, and droughtiness, this soil generally is unsuited to cultivated crops and is poorly suited to pasture. It is too steep for intensive pasture management. In most years drought reduces forage yields late in summer. No-till seeding helps to control erosion.

This soil is well suited or moderately suited to trees. Building logging roads and skid trails on the contour helps to control erosion and facilitates the use of equipment. Water bars and a good plant cover also help to control erosion. The seedling mortality rate on south aspects can be reduced by planting seedlings that have been transplanted once or by mulching.

This soil generally is unsuited to building site development and septic tank absorption fields because of the slope.

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

RhE—Rigley-Coshocton complex, 18 to 25 percent slopes. These steep soils are on unglaciated hillsides. The well drained Rigley soil commonly is on the upper part of the slopes, and the moderately well drained Coshocton soil is on the lower part. Slopes are generally uniform and are about 200 to 300 feet long. Areas generally are long and narrow and are 10 to 50 acres in size. They are about 45 percent Rigley fine sandy loam and 40 percent Coshocton silt loam. Either soil can dominate on any given slope. The two soils occur as areas so intricately mixed that separating them in mapping was not practical.

Typically, the Rigley soil has a surface layer of very dark grayish brown, very friable fine sandy loam about 3 inches thick. The subsurface layer is brown, very friable fine sandy loam about 5 inches thick. The subsoil is yellowish brown and brownish yellow, very friable sandy loam about 42 inches thick. The substratum to a depth of about 70 inches is brownish yellow, very friable channery sandy loam. In some areas the surface layer is sandy loam or stony fine sandy loam.

Typically, the Coshocton soil has a surface layer of brown, friable silt loam about 6 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish brown, friable silt loam and firm silty clay loam, and the lower part is yellowish brown and light brownish gray, mottled, firm silty clay loam. The substratum is yellowish brown, mottled, firm silty clay loam. Soft shale bedrock is at a depth of about 67 inches. In places the surface layer and the upper part of the subsoil are loam or stony silt loam.

Included with these soils in mapping are soils that are very channery in the surface layer and in the upper part of the subsoil. Also included are seeps in areas where the Coshocton soil is downslope from the Rigley soil. Inclusions make up about 15 percent of most areas.

Permeability is moderately rapid in the Rigley soil and moderately slow or slow in the Coshocton soil. Available water capacity is low or moderate in the Rigley soil and moderate in the Coshocton soil. Runoff is very rapid on both soils. The Coshocton soil has a perched seasonal high water table at a depth of 18 to 36 inches during extended wet periods. Tilth is good in both soils. The root zone is deep.

Most areas are used as woodland. Some areas are used for hay or permanent pasture.

These soils are generally unsuited to row crops because of the slope and the hazard of erosion. They are poorly suited to hay but are moderately suited to permanent pasture. Unless an adequate plant cover is maintained, especially in conventionally tilled areas, erosion is a very severe hazard. No-till seeding helps to control erosion and conserves moisture. The Rigley soil is better suited to grazing in winter and early in spring than to grazing during other parts of the year because the low or moderate available water capacity retards plant growth during dry periods. Grazing when the Coshocton soil is too wet causes compaction, poor tilth, and an increased runoff rate. Deferment of grazing during wet periods helps to keep the pasture in good condition.

These soils are well suited or moderately suited to trees. If too much of the ground cover is removed when the trees are harvested, erosion is a hazard. Building logging roads or skid trails on the contour and establishing water bars and a good plant cover help to control erosion and facilitate the use of equipment. The seedling mortality rate on south aspects can be reduced by planting seedlings that have been transplanted once or by mulching.

These soils are poorly suited to building site

development and are generally unsuited to septic tank absorption fields because of the slope of both soils and the wetness and slow permeability in the Coshocton soil. Buildings should be designed so that they conform to the natural slope of the land. In areas of the Coshocton soil, installing drains at the base of footings helps to keep basements dry. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

RsA—Rush silt loam, 0 to 2 percent slopes. This deep, nearly level, well drained soil is on flats on Wisconsinan outwash terraces. Areas are irregularly shaped and are 50 to 200 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 58 inches thick. The upper part is yellowish brown and strong brown, friable silt loam and silty clay loam, and the lower part is brown, firm gravelly clay loam and very gravelly sandy clay loam. The substratum to a depth of about 80 inches is brown, calcareous, loose very gravelly loamy sand. In a few places the surface layer is darker colored. In some areas sand and gravel are below a depth of 80 inches. In other areas the upper part of the subsoil is thicker.

Included with this soil in mapping are small areas where the substratum is gravelly loam or gravelly sandy loam. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Rush soil and very rapid in the substratum. Available water capacity is high. Runoff is slow. Tilth is good. The root zone is deep.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. Because of the suitability of this soil for cropland, only a few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. It is well suited to row cropping year after year and to specialty crops because of the nearly level slopes, the high available water capacity, and the good natural drainage. Either conventional tillage methods or a system of conservation tillage that leaves crop residue on the surface can be used. The soil dries and warms early in spring and thus is well suited to tilling and planting early in spring. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil helps to maintain tilth and minimizes crusting.

This soil is well suited to pasture and hay. Because of the good drainage, it is well suited to grazing in winter and early in spring. If lime is applied, it is well suited to deep-rooted legumes, such as alfalfa.

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

This soil is well suited to building site development and septic tank absorption fields, but a moderate shrink-swell potential is a limitation. Backfilling around foundations with material that has a low shrink-swell potential helps to prevent the structural damage caused by shrinking and swelling. Sloughing is a hazard in shallow excavations.

This soil is a probable source of sand and gravel.

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

Se—Sebring silt loam. This deep, nearly level, poorly drained soil is on flats and in depressions on Wisconsinan lake plains and terraces along streams. It receives runoff from the higher adjacent soils and is subject to ponding. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 4 to 20 acres in size.

Typically, the surface layer is grayish brown, friable silt loam about 8 inches thick. The subsoil is about 42 inches of light brownish gray and gray, mottled, friable silt loam and firm silty clay loam. The substratum to a depth of about 80 inches is gray, mottled, firm silt loam. In places the subsoil or substratum is loam.

Included with this soil in mapping are small areas of the very poorly drained Luray soils in depressions and small areas of the moderately well drained Glenford soils on slight rises. Also included are some areas where the subsoil or substratum has layers of gravelly loam or sandy loam. Included soils make up about 20 percent of most areas.

Permeability is moderately slow in the Sebring soil. Available water capacity is high. Runoff is very slow or ponded. The seasonal high water table is near or above the surface during extended wet periods. Tilth is good. Unless the soil is drained, the water table restricts the root zone.

Most areas are used as hayland, pasture, or woodland. Some areas are used for row crops or small grain.

If drained, this soil is moderately suited to corn, soybeans, and small grain. Surface and subsurface drains commonly are used to remove excess surface water and lower the seasonal high water table in areas where adequate outlets are available. In areas where natural drainage outlets are not available, the ponding can destroy small grain crops. A surface crust forms in tilled areas after hard rains.

This soil is well suited to forage species that can withstand wetness. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing

when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. Forage production is relatively good during dry periods.

This soil is well suited to trees that can withstand wetness. Planting seedlings that can withstand wetness and that have been transplanted once reduces the seedling mortality rate. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Logging when the soil is frozen or during the drier parts of the year minimizes compaction and the formation of ruts and facilitates the use of equipment.

Because of the ponding and the moderately slow permeability, this soil is poorly suited to building site development and septic tank absorption fields. It is better suited to dwellings without basements than to dwellings with basements. A drainage system is needed, but drainage outlets are not available in some areas. Properly landscaping building sites results in good surface drainage. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Enlarging the absorption area improves the capacity of the fields to absorb effluent.

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

Sh—Shoals silt loam, occasionally flooded. This deep, nearly level, somewhat poorly drained soil is on flood plains. It occupies the entire width of narrow flood plains and commonly is in low areas on wide flood plains. Slopes are 0 to 2 percent. Most areas are long and narrow and are 4 to 50 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 13 inches thick. The upper part of the substratum is grayish brown and yellowish brown, mottled, firm silt loam and silty clay loam and friable loam. The lower part to a depth of about 60 inches is gray, mottled, friable loam and gravelly loam. In some places the lower part of the substratum is loam glacial till. In other places the soil is moderately well drained.

Included with this soil in mapping are small areas of the somewhat poorly drained Algiers soils. These soils are in the same landscape positions as the Shoals soil. Also included are the very poorly drained Sloan soils in some high water channels. Included soils make up about 15 percent of most areas.

Permeability is moderate in the Shoals soil. Available water capacity is high. Runoff is very slow. The seasonal high water table is at a depth of 6 to 18 inches during extended wet periods. Tilth is good. Unless the soil is drained, the water table restricts the root zone.

The use of this soil is determined to a large extent by the size, shape, and accessibility of individual areas. Most of the larger, more accessible areas are used for row crops or hay. Many of the narrow, inaccessible areas and the areas dissected by old stream channels are used as pasture or woodland.

If drained, this soil is well suited to corn and soybeans. Because of the flooding, it is not so well suited to winter wheat and oats. The flooding and the seasonal wetness are the major management concerns, especially in areas used for small grain. Subsurface drains are used to lower the seasonal high water table in areas where good outlets are available. Some areas do not have suitable natural outlets. Water is likely to back up into subsurface drains when water levels are high in the stream channels. Floodwater results in gullying, washes out subsurface drains, buries seedlings, and carries away recently applied plant nutrients. A surface crust forms in tilled areas after heavy rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage.

This soil is well suited to trees that can withstand some wetness. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Logging when the soil is frozen or during the drier parts of the year minimizes compaction and the formation of ruts and facilitates the use of equipment. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

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

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

SkA—Sleeth silt loam, 0 to 2 percent slopes. This deep, nearly level, somewhat poorly drained soil is on flats and slight rises on Wisconsinan outwash terraces. Most areas are irregularly shaped and are 5 to 25 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 9 inches thick. The subsoil is about 46 inches thick. The upper part is brown and yellowish brown, mottled, friable silt loam, loam, and clay loam, and the lower part is dark grayish brown and grayish brown, mottled, firm gravelly clay loam and

gravelly sandy clay loam. The substratum to a depth of about 60 inches is grayish brown, loose gravelly sand.

Included with this soil in mapping are small areas of the very poorly drained Westland soils in depressions, small areas of the well drained Ockley soils on slight rises, and areas of soils in which the substratum is loam or gravelly sandy loam. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Sleeth soil and very rapid in the substratum. Available water capacity is moderate or high. Runoff is slow. The seasonal high water table is at a depth of 12 to 36 inches during extended wet periods. Tilth is good. Unless the soil is drained, the water table restricts the root zone.

Most areas are used for row crops or small grain. Some areas are used for hay or pasture. A few areas are wooded.

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. It delays planting and limits the choice of crops that can be grown. Surface drains commonly are used to remove excess surface water and provide outlets for subsurface drains. Subsurface drains commonly are used to lower the seasonal high water table. A surface crust forms in tilled areas after hard rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. Deep-rooted legumes can be grown in areas that are adequately drained.

This soil is well suited to trees that can withstand some seasonal wetness. No major hazards or limitations affect planting or harvesting.

This soil is poorly suited to building site development and septic tank absorption fields because of the seasonal wetness. Subsurface drains reduce the wetness. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Sloughing is a hazard in shallow excavations.

This soil is a probable source of sand and gravel. The included areas where the substratum is loam or gravelly sandy loam are not probable sources.

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

So—Sloan silt loam, frequently flooded. This deep, nearly level, very poorly drained soil is on flood plains. It commonly is in high water channels and on other low parts of the flood plains. Slopes are 0 to 2 percent. Most areas are long and narrow and are 10 to 35 acres in size.

Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer is about 10 inches of black and very dark gray, friable silt loam and clay loam. It is mottled below a depth of about 14 inches. The subsoil is dark gray and dark grayish brown, mottled, friable loam about 17 inches thick. The substratum to a depth of about 60 inches is dark grayish brown and gray, mottled, friable gravelly loam and silt loam. In some areas the surface layer and subsurface layer are thicker. In a few places the upper part of the soil is muck.

Included with this soil in mapping are small areas of the moderately well drained Medway and somewhat poorly drained Shoals soils. These soils are slightly higher on the landscape than the Sloan soil. They make up about 15 percent of most areas.

Permeability is moderate or moderately slow in the Sloan soil. Available water capacity is high. Runoff is very slow. The seasonal high water table is at or near the surface during extended wet periods. Tilth is good. Unless the soil is drained, the water table restricts the root zone.

The use of this soil is determined to a large extent by the size, shape, and accessibility of individual areas. Most of the larger, more accessible areas that are drained are used for row crops or hay. Many of the narrow, inaccessible areas and the areas dissected by high water channels are used as pasture or woodland.

If drained, this soil is moderately suited to corn and soybeans. Flooding severely damages winter grain. Surface drains commonly are used to remove excess surface water. Subsurface drains are used to remove excess water from the subsoil in areas where suitable drainage outlets are available. Water backs up in subsurface drains when water levels are high in stream channels. Establishing adequate outlets is difficult in some areas. Tilling and harvesting at optimum moisture levels help to maintain tilth and minimize compaction.

This soil is well suited to hay and pasture. Grazing when the soil is too wet causes compaction and poor tilth. Pasture rotation and deferment of grazing during wet periods help to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage.

This soil is well suited to trees that can withstand wetness. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Plant competition can be controlled by removing vines and the less desirable trees and shrubs. Frequent, light thinning or harvesting improves the vigor of the stand

and reduces the hazard of windthrow. Logging when the soil is frozen or during the drier parts of the year minimizes compaction and the formation of ruts and facilitates the use of equipment.

This soil is generally unsuited to building site development and septic tank absorption fields because of the flooding, the seasonal wetness, and the moderate or moderately slow permeability.

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

St—Stonelick loam, occasionally flooded. This deep, nearly level, well drained soil is on narrow or wide flood plains that originate mainly in areas of Wisconsinan glacial drift. Slopes are 0 to 2 percent. Most areas are 10 to 70 acres in size. Some areas are larger than 100 acres.

Typically, the surface layer is brown, calcareous, friable loam about 9 inches thick. The subsurface layer also is brown, calcareous, friable loam. It is about 5 inches thick. The upper part of the substratum is dark yellowish brown and yellowish brown, calcareous, friable and very friable fine sandy loam. The lower part to a depth of about 60 inches is dark yellowish brown, calcareous, very friable and loose, stratified silt loam, fine sandy loam, and loamy sand. In some areas the substratum contains more silt and less sand. In a few areas the soil is subject to rare flooding. In places it is not calcareous throughout.

Included with this soil in mapping are narrow areas of the somewhat poorly drained Shoals soils in slight depressions and high water channels. Some of these areas are in the flood pool of the Dillon Reservoir and are subject to controlled flooding. Also included are areas where unstabilized, gravelly, sandy, and silty riverwash of recent origin is in or along perennial or intermittent stream channels. These areas are flooded and washed or reworked by streams so frequently that they commonly are devoid of vegetation. Inclusions make up about 20 percent of most areas.

Permeability is moderately rapid in the Stonelick soil. Available water capacity is low or moderate. Runoff is slow. Tilth is good. The root zone is deep.

Most areas are used for row crops, small grain, hay, or pasture. Some areas are wooded, especially along the stream channels.

This soil is well suited to corn and soybeans, but droughtiness and the hazard of flooding are management concerns. The flooding can damage small grain in some areas. Irrigation can minimize droughtiness. The surface layer can be worked throughout a wide range of moisture content. If good management, including adequate weed control, is applied, the soil is well suited to no-till farming or another system of conservation tillage that leaves crop residue on the surface and thus conserves moisture. Unlike most of the soils in the county, this soil typically has a mildly alkaline surface layer that is high in content of lime. As a result, applications of lime are not needed. Applying acid-based fertilizer reduces the alkalinity. The reaction to applications of nitrogen, phosphorus, and herbicide can differ from the reaction on more acid soils. The soil can be deficient in trace elements. The included areas of riverwash generally are unsuited to cultivated crops. Some areas along the stream channels are subject to streambank erosion.

This soil is well suited to hay and pasture. The sedimentation caused by floodwater reduces the quality of the forage. Drought retards the growth of forage plants.

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

Because of the flooding, this soil generally is unsuited to building site development and septic tank absorption fields.

This soil is a probable source of sand.

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

Su—Stonelick-Urban land complex, occasionally flooded. This map unit consists of a deep, nearly level, well drained Stonelick soil and areas of Urban land on flood plains. Flooding can occur at any time of the year but is most likely in winter and spring. Some areas are protected to varying degrees by levees. Slopes are 0 to 2 percent. Areas commonly have straight boundaries with distinct corners and are 50 to 200 acres in size. Most are about 40 percent Stonelick loam and 35 percent Urban land. The Stonelick soil and Urban land occur as areas so intricately mixed or small that separating them in mapping was not practical.

Typically, the Stonelick soil has a surface layer of brown, calcareous, friable loam about 9 inches thick. The subsurface layer also is brown, calcareous, friable loam. It is about 5 inches thick. The substratum to a depth of about 60 inches is dark yellowish brown and yellowish brown, calcareous, friable fine sandy loam and silt loam and loose loamy sand. Some areas have been filled and thus are elevated above the normal level of flooding.

The Urban land is covered by streets, highways, parking lots, buildings, and other structures.

Included with the Stonelick soil and Urban land in mapping are small areas of the well drained Ockley soils on outwash terraces above the flood plains. These soils make up about 25 percent of most areas.

Permeability is moderately rapid in the Stonelick soil. Available water capacity is low or moderate. Runoff is

slow. Tilth is good. The root zone is deep.

The Stonelick soil is used for lawns, gardens, or parks. It is droughty during extended dry periods. The grasses, legumes, and shrubs selected for planting, especially in some of the droughtier areas, should be those that can withstand the low or moderate available water capacity.

Because of the flooding, the Stonelick soil is generally unsuited to building site development and septic tank absorption fields, but it is well suited in the areas that are protected by levees.

The Stonelick soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

Tg—Tioga fine sandy loam, occasionally flooded. This deep, nearly level, well drained soil is on narrow or wide flood plains that originate mainly in areas of sandstone, siltstone, and shale bedrock. Slopes are 0 to 2 percent. Most areas are long and narrow and are 10 to 70 acres in size. Some areas are larger than 100 acres.

Typically, the surface layer is brown, very friable fine sandy loam about 8 inches thick. The subsoil is yellowish brown and dark yellowish brown, very friable fine sandy loam about 15 inches thick. The substratum to a depth of about 60 inches is yellowish brown, loose very gravelly loamy sand. In some places the soil is moderately well drained. In other places the subsoil contains more silt and less sand.

Included with this soil in mapping are narrow areas of the somewhat poorly drained Orrville soils in slight depressions and high water channels. Also included are small areas where unstabilized, gravelly, sandy, and silty riverwash is in or along the stream channels. Inclusions make up about 15 percent of most areas.

Permeability is moderate or moderately rapid in the subsoil of the Tioga soil and rapid in the substratum. Available water capacity is low or moderate. Runoff is slow. The seasonal high water table is at a depth of 36 to 72 inches during extended wet periods. Tilth is good. The root zone is deep.

Most areas are used for row crops, small grain, hay, or pasture. Some areas are wooded.

This soil is well suited to corn, soybeans, and small grain. The hazard of flooding and droughtiness during extended dry periods are the main management concerns. Irrigation can reduce the droughtiness. The surface layer can be worked throughout a wide range of moisture content. Small, frequent applications of plant nutrients minimize the losses caused by leaching. If good management, including adequate weed control, is applied, the soil is well suited to no-till farming or another system of conservation tillage that leaves crop residue on the surface and thus conserves moisture. Some areas along the stream channels are subject to streambank erosion.

This soil is well suited to pasture and hay. Alfalfa can be grown if lime is applied. Drought retards plant growth during dry periods. The sedimentation caused by floodwater reduces the quality of the forage.

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

Because of the flooding, the seasonal wetness, and a poor filtering capacity, this soil is generally unsuited to building site development and septic tank absorption fields.

This soil is a probable source of sand and gravel.

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

TsB—Titusville silt loam, 2 to 6 percent slopes. This deep, gently sloping, moderately well drained soil is on low knolls and ridges on Illinoian till plains. Most areas are irregularly shaped and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 9 inches thick. The subsoil is about 45 inches thick. The upper part is yellowish brown, friable and firm silt loam and silty clay loam. The next part is a fragipan of yellowish brown, very firm, brittle gravelly loam and clay loam. The lower part is yellowish brown, firm loam. The subsoil is mottled below a depth of about 18 inches. The substratum to a depth of about 80 inches is yellowish brown, mottled, firm loam glacial till. In some areas the slope is 0 to 2 percent.

Included with this soil in mapping are small areas of somewhat poorly drained soils along drainageways and small areas of Coshocton soils on the higher parts of ridges and knolls. Coshocton soils do not have a fragipan. Included soils make up about 10 percent of most areas.

Permeability is slow in the Titusville soil. Available water capacity is moderate. Runoff is medium in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone commonly is restricted to the part of the profile above the compact, dense fragipan at a depth of 18 to 28 inches.

Most areas are used as cropland or pasture. A few areas are wooded.

This soil is well suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is moderate. A surface crust forms after hard rains. Applying a system of no-till farming or another type of conservation tillage that leaves crop residue on the surface, including grasses and legumes in the crop rotation, and returning crop residue to the soil help to control erosion and

minimize crusting. Grassed waterways also help to control erosion. Subsurface drains are used to remove excess water.

This soil is well suited to hay and pasture. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. If lime is applied, deep-rooted legumes can be grown in adequately drained areas.

This soil is well suited to trees. The seedling mortality rate can be reduced by planting seedlings that have been transplanted once. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow.

Because of the seasonal wetness and the slow permeability, this soil is only moderately suited to building site development and is poorly suited to septic tank absorption fields. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Surface and subsurface drains remove excess water and lower the seasonal high water table. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Enlarging septic tank absorption fields and installing the distribution lines in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent. Perimeter drains around the absorption fields lower the seasonal high water table and intercept lateral seepage along the top of the fragipan. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

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

TsC2—Titusville silt loam, 6 to 12 percent slopes, eroded. This deep, sloping, moderately well drained soil is mainly on ridges and knolls on Illinoian till plains. In some areas it is on foot slopes at the base of the steeper hillsides. Erosion has removed part of the original surface layer. Tillage has mixed subsoil material into the present surface layer. Slopes are smooth or concave and commonly are 100 to 300 feet long. Most areas are irregularly shaped and are 5 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 6 inches thick. It has yellowish brown specks. The subsoil extends to a depth of about 60 inches. The upper part is yellowish brown, firm silty clay loam and clay loam. The next part is a fragipan of yellowish brown, very firm, brittle clay loam. The lower part is brown, firm loam. The subsoil is mottled below a depth of about 17 inches. In some areas the fragipan contains more silt.

Included with this soil in mapping are small areas of Coshocton soils on the upper part of some slopes, a few seeps on the lower part of some slopes, and some areas of severely eroded soils on the upper part of the slopes. Coshocton soils do not have a fragipan. In the severely eroded soils, the surface layer is clay loam and tilth is fair. Inclusions make up about 15 percent of most areas.

Permeability is slow in the Titusville soil. Available water capacity is moderate. Runoff is rapid in cultivated areas. The seasonal high water table is perched at a depth of 18 to 36 inches during extended wet periods. Tilth is good. The root zone commonly is restricted to the part of the profile above the compact, dense fragipan at a depth of 18 to 28 inches.

Most areas are used for hay or pasture. Some areas are used for row crops or small grain or are wooded.

This soil is moderately suited to corn, soybeans, and small grain. In tilled areas the hazard of erosion is severe. Significant erosion has occurred, reducing the level of natural fertility and increasing the need for lime and fertilizer. A surface crust forms in tilled areas after hard rains. No-till farming or another system of conservation tillage that leaves crop residue on the surface, crop rotations that include meadow crops, and contour stripcropping help to control erosion and minimize crusting. Grassed waterways also help to control erosion. Random subsurface drains are used to remove excess water in areas of seeps.

This soil is well suited to hay and pasture. Compaction, poor tilth, and an increased runoff rate result from grazing when the soil is too wet. Timely deferment of grazing helps to keep the pasture in good condition. If the pasture is plowed during seedbed preparation or is overgrazed, the hazard of erosion is severe. No-till seeding helps to control erosion.

This soil is well suited to trees. The seedling mortality rate can be reduced by planting seedlings that have been transplanted once. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow.

Because of the slope, the seasonal wetness, and the slow permeability, this soil is only moderately suited to building site development and is poorly suited to septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Water moves laterally on top of the fragipan and into excavations, particularly in concave areas and on the lower part of the slopes. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Installing the distribution lines in septic tank absorption fields on the contour helps to prevent seepage of effluent to the surface. Perimeter drains upslope from the absorption

fields intercept lateral seepage and lower the seasonal high water table. Enlarging septic tank absorption fields and installing the distribution lines in the part of the profile above the fragipan improve the capacity of the fields to absorb effluent. The hazards of runoff and erosion can be reduced by maintaining a plant cover where possible on the construction site.

The land capability classification is IIIe. The woodland ordination symbol is 5D.

Uf—Udorthents, loamy. These soils are in areas that have been used for the disposal of trash, concrete, wood, bricks, and other waste products. A few areas were filled mainly with fiberglass waste material. One area was used as a borrow pit for road subgrade and does not have waste material. In the areas that have waste material, slopes are smooth, are convex, or are irregularly contoured because of settling. They are dominantly 6 to 12 percent. Most areas are 5 to 25 acres in size, but a few are larger.

Typically, the surface layer is firm, calcareous loam about 18 inches thick. It is underlain by the discarded material.

Included with these soils in mapping are small areas of soils that are similar to the adjacent soils. These included soils are around the edges of the mapped areas. Also included are a few areas where the slope is 2 to 6 percent or 12 to 25 percent, some areas that have mostly solid mineral waste and are relatively stable, areas that have a very high content of organic material that is very unstable and will gradually decompose and cause settling, and areas where the upper part of the original soil has been removed and the subsoil or substratum is exposed. Inclusions make up about 20 percent of most areas.

The Udorthents have poor physical properties. Runoff varies greatly but is dominantly medium or rapid.

A plant cover is needed on these soils to control erosion. Adding topsoil can increase the depth of the root zone and the available water capacity of the soils. Onsite investigation is needed to determine the suitability for specific uses.

These soils are not assigned a land capability classification or a woodland ordination symbol.

Wa—Wallkill silt loam, clayey substratum, frequently flooded. This deep, nearly level, very poorly drained soil is in depressions on flood plains. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 10 to 60 acres in size.

Typically, the upper 24 inches is recent alluvium, which is dark grayish brown, friable silt loam. The alluvium is mottled in the lower part. It is underlain by black, friable and slightly sticky muck about 18 inches thick. The substratum to a depth of about 80 inches is black, slightly sticky, organic-rich clay and gray, very sticky clay. In some areas the alluvium is less than 16 inches deep over the buried muck. In a few areas the soil has no underlying layers of clay.

Included with this soil in mapping are small areas of the poorly drained Killbuck and somewhat poorly drained Algiers soils. These soils are in the same landscape positions as the Wallkill soil. They make up about 15 percent of most areas.

Permeability is moderate in the recent alluvium in the Wallkill soil and slow in the underlying clay. Available water capacity is very high. Runoff is very slow. The seasonal high water table is at or near the surface during extended wet periods. Tilth is good. Unless the soil is drained, the water table restricts the root zone.

Most areas are used for row crops. Some areas are used for hay or pasture. A few undrained areas are wooded.

If drained, this soil is moderately suited to corn, soybeans, and some specialty crops. It is generally unsuited to small grain because of the frequent flooding. Surface and subsurface drains can remove excess surface water and lower the water table in areas where suitable outlets are available. Establishing adequate outlets is difficult in some areas. A surface crust forms in tilled areas after heavy rains. Returning crop residue to the soil minimizes crusting.

This soil is well suited to hay and pasture. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The sedimentation caused by floodwater reduces the quality of the forage. The species that can withstand wetness should be selected for planting.

This soil is moderately suited to trees. Planting seedlings that have been transplanted once and can withstand wetness reduces the seedling mortality rate. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow. Logging when the soil is frozen or during the drier parts of the year minimizes compaction and the formation of ruts and facilitates the use of equipment. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is generally unsuited to building site development and septic tank absorption fields because of the frequent flooding, the wetness, low strength in the buried organic layer, and the slow permeability.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Ws—Westland silty clay loam. This deep, nearly level, very poorly drained soil is on flats and in depressions on Wisconsinan outwash terraces. It receives runoff from the higher adjacent areas and is subject to ponding. Slopes are 0 to 2 percent. Most areas are irregularly shaped and are 10 to 40 acres in size. Some areas are larger than 150 acres.

Typically, the surface layer is black, firm silty clay loam about 8 inches thick. The subsurface layer also is black, firm silty clay loam. It is about 7 inches thick. The subsoil is about 40 inches thick. The upper part is dark gray and gray, mottled, firm clay loam, and the lower part is gray, mottled, firm loam and dark gray, very friable gravelly sandy loam. The substratum to a depth of about 60 inches is dark gray, loose very gravelly loamy coarse sand. In places the soil is somewhat poorly drained. In some areas it receives light colored overwash from the adjacent eroding slopes.

Included with this soil in mapping are small areas of the somewhat poorly drained Sleeth soils on slight rises and small areas of the very poorly drained Luray soils in depressions. Also included are areas of soils in which the substratum is gravelly loam glacial outwash or loam glacial till. Included soils make up about 15 percent of most areas.

Permeability is moderate in the subsoil of the Westland soil and very rapid in the substratum. Available water capacity is high. Runoff is very slow or ponded. The seasonal high water table is near or above the surface during extended wet periods. Tilth is fair. Unless the soil is drained, the water table restricts the root zone.

Most areas are used for row crops or small grain. Some areas are used as pasture or hayland. Undrained areas commonly are wooded.

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. It delays planting and limits the number of crops that can be grown. The soil responds well to measures that improve drainage and minimize compaction. Surface and subsurface drains commonly are used to remove excess water. Fall tillage is less likely to cause compaction than spring tillage because the soil is generally drier in the fall. Puddles and clods form if the soil is worked when it is too wet. A tillage system that leaves the surface rough hastens drying.

This soil is well suited to pasture and hay. Compaction, poor tilth, and a decreased rate of water infiltration result from grazing when the soil is too wet. Deferment of grazing during wet periods helps to keep the pasture in good condition. The species that can withstand wetness, such as alsike clover, should be selected for planting.

This soil is well suited to trees that can withstand wetness. Logging when the soil is frozen or during the drier parts of the year helps to prevent the formation of ruts, minimizes compaction, and facilitates the use of equipment. Planting seedlings that have been transplanted once reduces the seedling mortality rate. Frequent, light thinning or harvesting improves the vigor of the stand and reduces the hazard of windthrow. Plant competition can be controlled by removing vines and the less desirable trees and shrubs.

This soil is poorly suited to building site development and septic tank absorption fields because of the ponding. It is better suited to dwellings without basements than to dwellings with basements. In areas where adequate outlets are available, drains at the base of footings can remove excess water. Applying an exterior coating to basement walls helps to keep basements dry. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Perimeter drains around the absorption fields can lower the seasonal high water table in areas where adequate outlets are available.

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

Wt—Westland-Urban land complex. This map unit consists of a deep, nearly level, very poorly drained Westland soil and Urban land on flats and in depressions on Wisconsinan outwash terraces. The Westland soil receives runoff from the higher adjacent areas and is subject to ponding. Slopes are 0 to 2 percent. Areas generally are long and narrow and are 10 to 100 acres in size. They are about 50 percent Westland silty clay loam and 30 percent Urban land. The Westland soil and Urban land occur in areas so intricately mixed or so small that separating them in mapping was not practical.

Typically, the Westland soil has a surface layer of black, firm silty clay loam about 8 inches thick. The subsurface layer also is black, firm silty clay loam. It is about 7 inches thick. The subsoil is about 40 inches thick. The upper part is dark gray and gray, mottled, firm clay loam, and the lower part is gray, mottled, firm loam and dark gray, very friable gravelly sandy loam. The substratum to a depth of about 60 inches is dark gray, loose very gravelly loamy coarse sand. In some places the soil is somewhat poorly drained. In a few areas the surface has been covered with fill material.

The Urban land is covered by buildings and pavement. The buildings are mainly single-family houses or apartment buildings, but some are industrial or commercial.

Included with the Westland soil and Urban land in mapping are small areas of the somewhat poorly drained Sleeth soils on slight rises, small areas of the

well drained Ockley soils on low knolls and ridges, a few small areas of Carlisle soils in depressions, and areas of Luray soils. Carlisle soils are organic throughout. Luray soils contain more silt and clay in the substratum than the Westland soil. They are in the same landscape positions as the Westland soil. Included soils make up about 20 percent of most areas.

Most areas have been drained by sewer systems, gutters, and storm drains. In undrained areas the Westland soil has a seasonal high water table near or above the surface during extended wet periods. Permeability is moderate in the subsoil of this soil and very rapid in the substratum. Available water capacity is high. Runoff is very slow or ponded. Tilth is fair.

The Westland soil is used for lawns or gardens. If drained, it is well suited to most vegetables, flowers, trees, and shrubs. Water-tolerant plants grow in undrained areas. The included filled areas are not well suited to lawns and gardens. In areas where the subsoil and substratum are exposed, tilth is very poor.

The Westland soil is poorly suited to building site development and septic tank absorption fields because of the ponding. A drainage system is needed. Properly landscaping building sites and septic tank absorption fields results in good surface drainage. Installing drains at the base of footings and applying an exterior coating to basement walls help to keep basements dry. Perimeter drains around septic tank absorption fields lower the seasonal high water table.

The Westland soil and the Urban land are not assigned a land capability classification or a woodland ordination symbol.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture.

Figure 15.—An area of Ockley soils where prime farmland is being converted to urban uses.

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 or 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 expenditure 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 241,000 acres in Licking County, or nearly 55 percent of the total acreage, potentially is prime farmland. Some of this acreage requires a drainage system or protection from flooding. The western part of the county is dominantly prime farmland. In the central and eastern parts, prime farmland generally is confined to areas on terraces, to some areas on flood plains in the major valleys, and to a small acreage on relatively narrow ridgetops.

A recent trend in land use in some parts of the county has resulted in the loss of some prime farmland to urban and industrial uses (fig. 15). The loss of prime farmland to other uses puts pressure on marginal lands, which generally are wet, more erodible, droughty, less easily cultivated, and less productive than prime farmland.

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 and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.