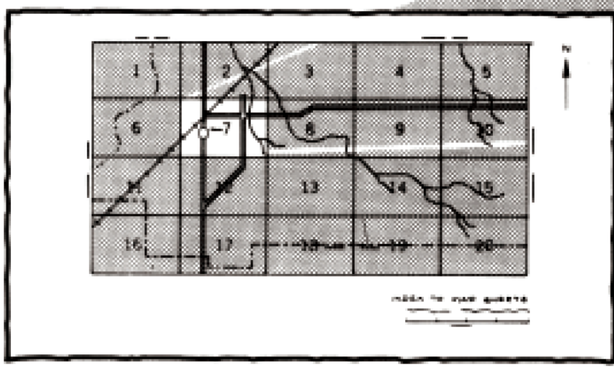
Soil Survey of

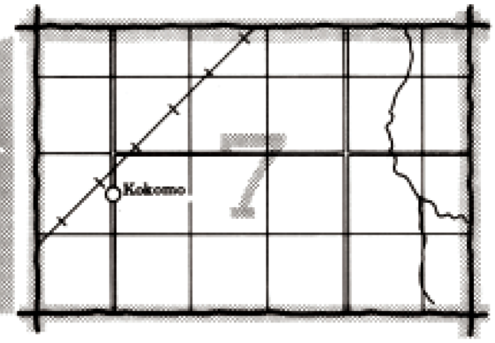
Sangamon County, Illinois

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Illinois Agricultural Experiment Station

HOW TO USE

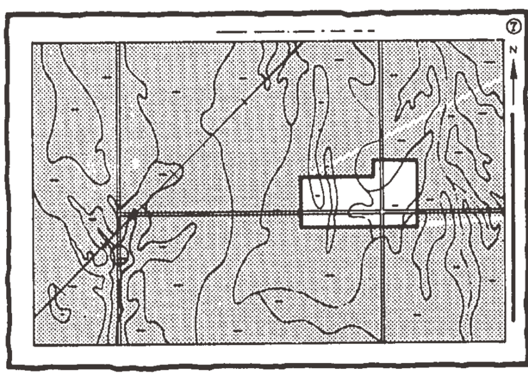
1. Locate your area of interest on the "Index to Map Sheets"

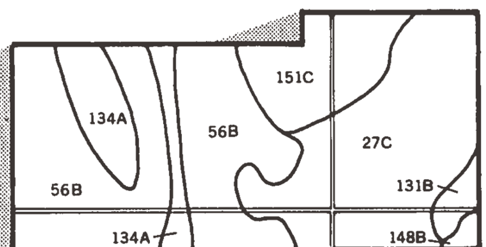




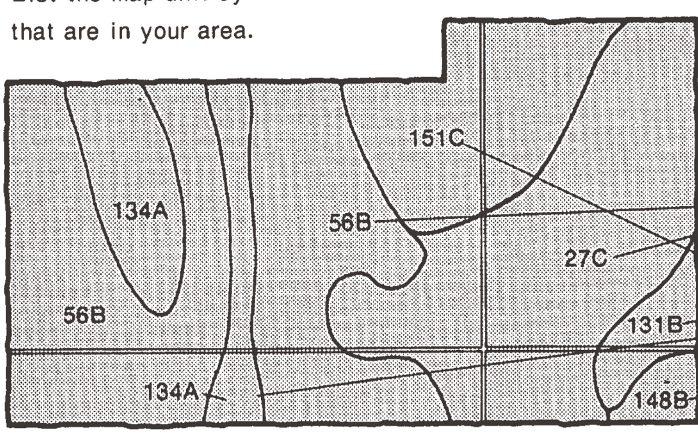
2. Note the number of the map sheet and turn to that sheet.

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





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

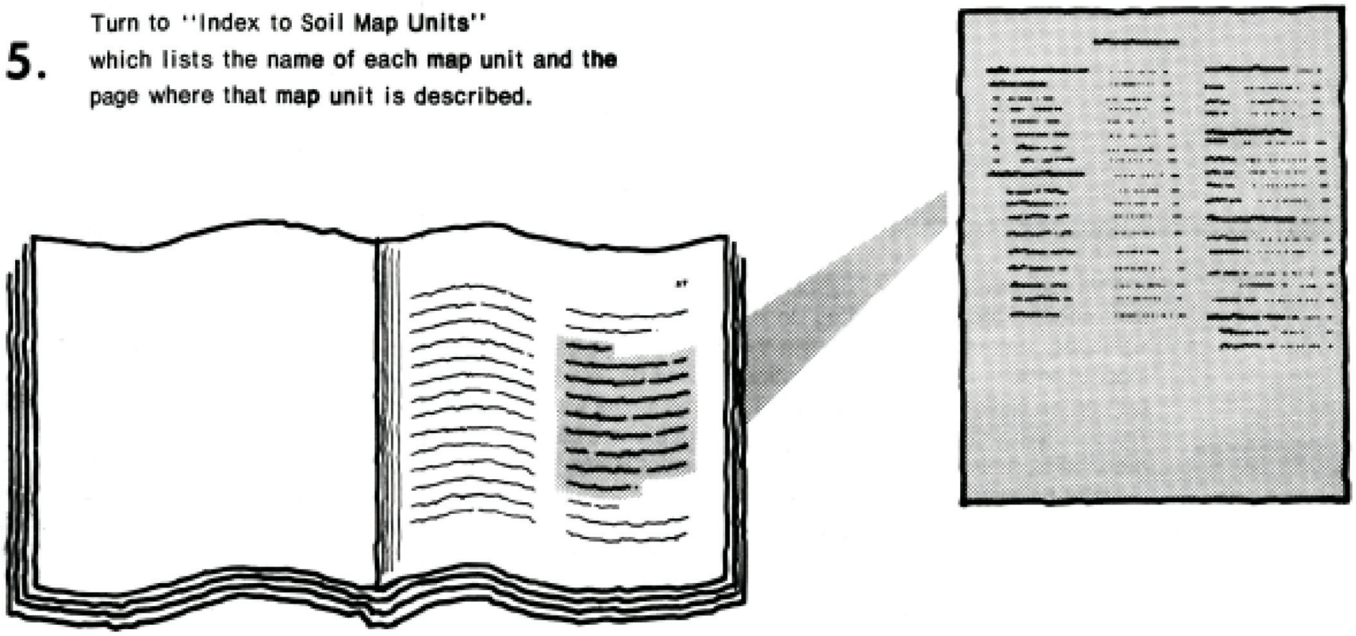


Symbols

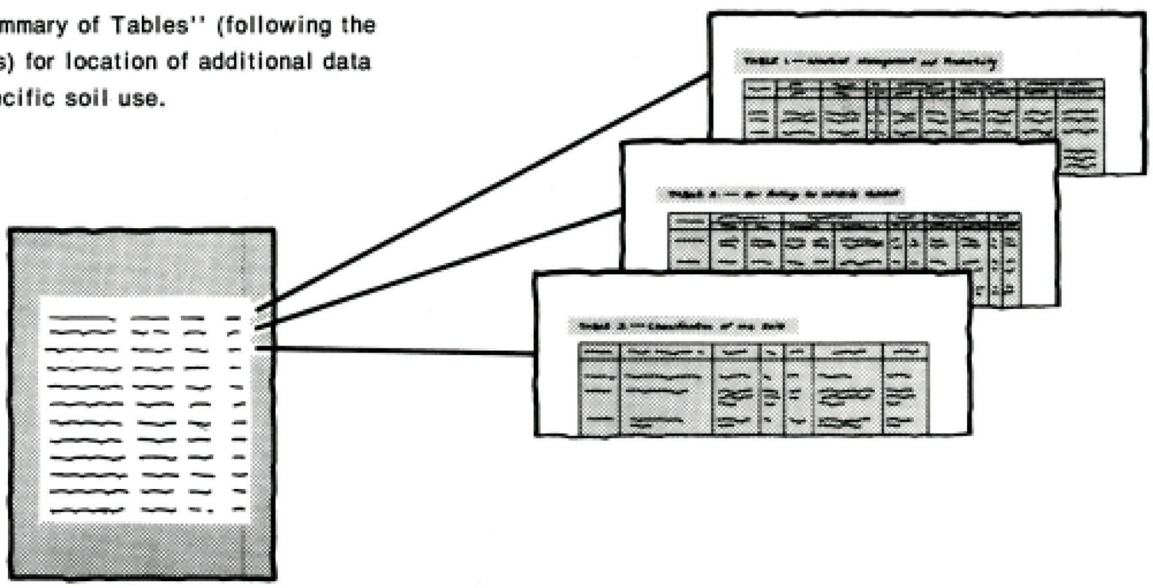
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

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



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



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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period April 1968 through June 1976. Soil names and descriptions were approved in January 1977. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Sangamon County Soil and Water Conservation District. This survey was financed in part by the County Board of Sangamon County, Illinois.

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.

This soil survey is Illinois Agricultural Experiment Station Soil Report No. 111.

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Issued May 1980

Index to map units

Summary of tables

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Foreword

This soil survey contains information that can be used in land-planning programs in Sangamon 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 insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

Warren J. Fitzgerald

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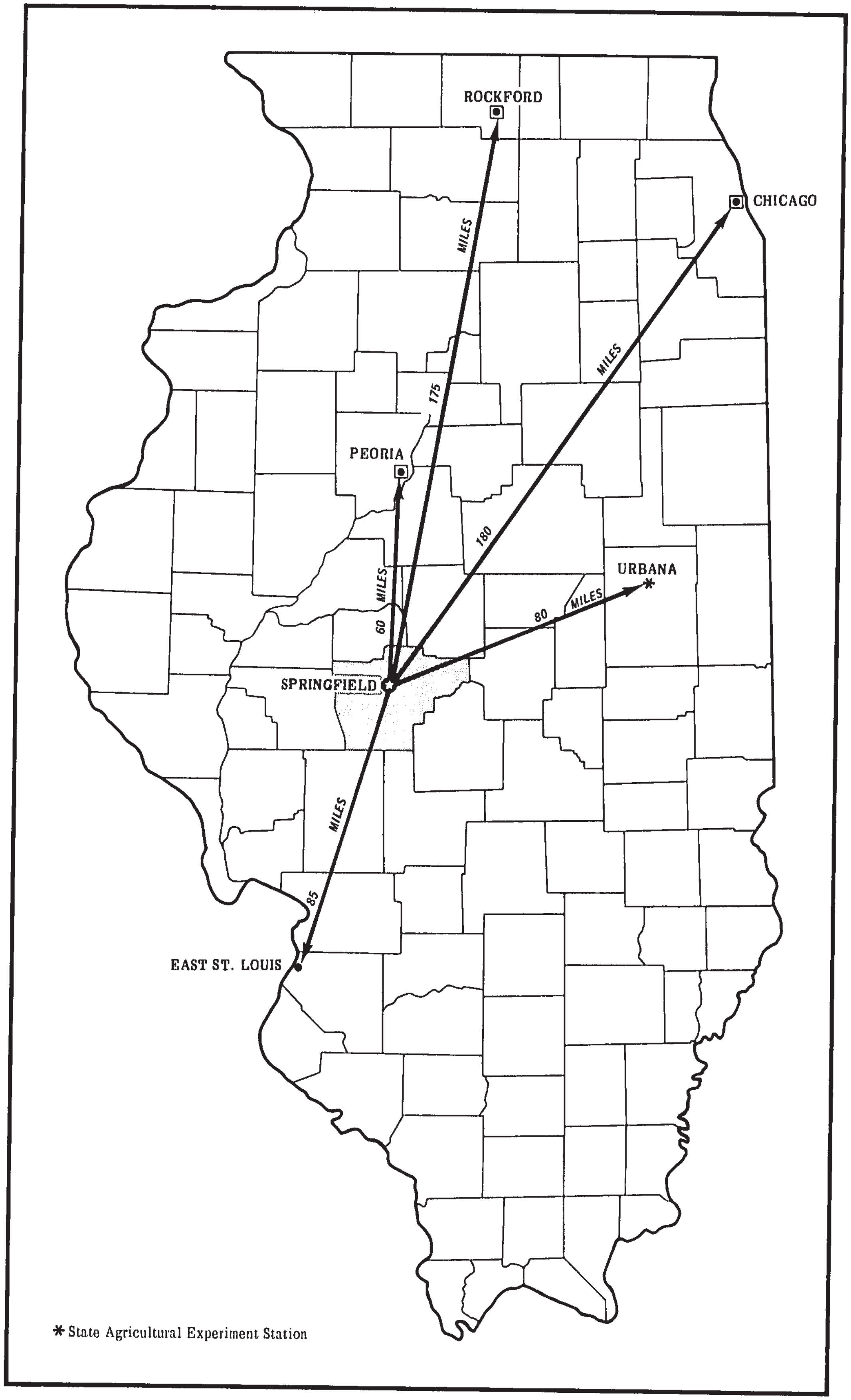
State Conservationist
Soil Conservation Service



Location of Sangamon County in Illinois.

Soil Survey of

Sangamon County, Illinois

United States Department of Agriculture
Soil Conservation Service
in cooperation with
Illinois Agricultural Experiment Station

By James F. Steinkamp, Soil Conservation Service

Fieldwork by J.F. Steinkamp, G.V. Berning, K.A. Gotsch, G.W. Hudelson, and D.R. Mapes, Soil Conservation Service

Others participating in the field survey were R.E. Bourland, T.M. Goddard, D.C. Hallbick, L.M. Kiefer, J.W. Scott, and J.A. Thompson, Soil Conservation Service

SANGAMON COUNTY is in the central part of Illinois. It covers 567,680 acres, or 887 square miles. In 1976, the population of Sangamon County was 171,560; and the population of Springfield, the largest city in the county, was 97,250. Springfield is the county seat and the state capital.

Most of the survey area is a loess-covered till plain that is dissected by the Sangamon River and the South Fork of the Sangamon River. The soils generally are deep, silty, and nearly level to sloping. The elevation ranges from 600 to 700 feet.

Sangamon County has a continental climate: summers are hot, and winters are cold. The average annual temperature is 53 degrees F. The annual precipitation in most years ranges from 30 to 38 inches.

The main enterprise in the county is farming. Corn and soybeans are the main crops. Government and health services provide most of the jobs in the county. Food processing, printing, publishing, and other industries also provide many jobs.

General nature of the survey area

This section gives general information about the survey area. It discusses climate, physiography and drainage, history and development, natural resources, transportation, and farming.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Springfield in the period 1951 to 1975. 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 29 degrees F, and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at Springfield on February 26, 1963, is -22 degrees. In summer the average temperature is 75 degrees, and the average daily maximum temperature is 85 degrees. The highest recorded temperature, which occurred on July 14, 1954, is 112 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 35 inches. Of this, 21 inches, or 60 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 5.12 inches at

Springfield on September 26, 1959. Thunderstorms occur on about 50 days each year, and most occur in summer.

Average seasonal snowfall is 24 inches. The greatest snow depth at any one time during the period of record was 15 inches. On an average of 15 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the South. Average windspeed is highest, 14 miles per hour, in March.

Tornadoes and severe thunderstorms strike occasionally. These storms are usually local and of short duration and cause damage in a variable pattern.

Physiography and drainage

Sangamon County is in the Springfield Plain region (*3*). This till plain is dissected by shallow river valleys. The moderately thick till was deposited during Illinoian and earlier stages of glaciation. The Buffalo Hart moraine—a broad, discontinuous ridge—rises above the general level of the plain in the vicinity of Buffalo Hart.

The natural drainage is westward. The Sangamon River and its tributaries—the South Fork of the Sangamon River and numerous smaller streams—drain all of the survey area except the northeastern corner.

History and development

Settlement of the survey area began more than 150 years ago. Springfield was settled in 1818-19 by people from South Carolina, Kentucky, and Virginia. It became the county seat in 1821, when Sangamon County was established. In 1831, Springfield was incorporated as a town. Partly through the efforts of Abraham Lincoln, it was made the state capital in 1837.

The area that is now Sangamon County at one time was part of the territory claimed by the Kickapoo and the Pottawatomie Indians. At that time, about 70 percent of the survey area, mainly the nearly level to strongly sloping uplands, was covered by prairie grasses. The rest of the area, mostly the more sloping land near streams, was timbered. The early settlers cleared and farmed the timbered areas. By 1830, metal plows were available, and the settlers started plowing the prairie. About 1875, underground drain tile became available and provided needed drainage to cultivate the wet, nearly level soils.

Natural resources

Soil is the most important natural resource in the county. Crops produced on the soil and livestock that feed on some of these crops are marketable.

The water supply is adequate for domestic use and for watering livestock. The area is well supplied with surface water, but the upper layers of the Pennsylvanian bedrock are an unreliable source of good quality ground water. Lake Springfield supplies water for most of the county. There are good sites for reservoirs along the Sangamon River and the many small streams.

Small oilfields are scattered throughout the east-central part of the county. Oil producing strata consist of Devonian and Silurian rocks—mainly limestone or dolomitic limestone—and in most places they are less than 2,000 feet deep. The Carbondale geologic formation is a limited source of coal. Most of this coal has been mined out by underground operations.

Sand and gravel are extracted mainly from the low terraces and the flood plain of the Sangamon River east of Springfield. Hills and ridges of sand and fine gravel are in the northeastern part of the county, and other deposits of resource quality are in the Sangamon Valley, west of Springfield. In the past, limestone, clay, and shale were mined from the Pennsylvanian rocks. The limestone was used in roadbeds and in the construction of buildings and for making agricultural lime. The shale was used in the manufacture of drain tile, sewer pipe, pottery, stoneware, and other clay products.

Transportation

A system of railroads and highways facilitated the rapid settlement and development of the county. Today, the Baltimore and Ohio, Chicago and Illinois Midland, Chicago and Northwestern, Illinois Central Gulf, Illinois Terminal, and Norfolk and Western railroads serve Springfield and other communities. The main highways crossing the county are Interstate 55, from north to south, and Interstate 72, from east to west. Other highways are U.S. Highways 36 and 66 and State Routes 4, 29, 54, 97, and 125. All these highways go through Springfield. All farms have access to surfaced roads. Capitol Airport, northwest of Springfield, provides freight and passenger services.

Farming

In 1974, according to the U.S. Census of Agriculture, about 470,249 acres, or 83 percent of the county, was farmland. There were 1,625 farms, and the average size was 289 acres. The average size has increased slightly in recent years. The number of farms that are 1,000 to 2,000 acres in size increased from 46 in 1969 to 62 in 1974. The number of farms that are 2,000 acres and larger increased from 3 in 1969 to 6 in 1974. During this same period, however, the number of farms that are 500 to 1,000 acres in size decreased from 259 to 247, and the number of farms that are 180 to 500 acres decreased from 648 to 478.

How this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

General soil map for broad land use planning

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

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

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

Descriptions of map units

1. Ipava-Tama-Sable

Nearly level to strongly sloping, somewhat poorly drained, well drained, and poorly drained, moderately permeable and moderately slowly permeable soils; on uplands

This map unit consists mainly of nearly level or depressional soils on loess-covered till plains. Gently sloping ridges and knolls are scattered throughout. Drainageways that have gently to strongly sloping side slopes are common. The slope ranges from 0 to 12 percent (fig. 1).

This map unit makes up about 47 percent of the survey area. It consists of about 40 percent Ipava soils, 30 percent Tama soils, 20 percent Sable soils, and 10 percent minor soils.

Ipava soils are nearly level and somewhat poorly drained. The surface soil typically is black silt loam and very dark gray silty clay loam. The subsoil is brown, grayish brown, and yellowish brown, mottled silty clay loam. The underlying material is yellowish brown and light brownish gray, calcareous silt loam.

Tama soils are nearly level to strongly sloping and are well drained. The surface layer typically is very dark grayish brown silt loam. The subsoil is dark brown, dark yellowish brown, and yellowish brown, mottled silty clay loam in the upper part and yellowish brown, mottled silt loam in the lower part. The underlying material is yellowish brown and light brownish gray, calcareous silt loam.

Sable soils are nearly level and depressional and are poorly drained. The surface soil typically is black silty clay loam. The subsoil is dark grayish brown and grayish brown, mottled silty clay loam and silt loam. The underlying material is light brownish gray, mottled, calcareous silt loam.

The minor soils include the well drained, silty Elkhart soils and the moderately well drained, silty Assumption soils. These soils are moderately sloping and strongly sloping, and they are on the side slopes of drainageways. Also of minor extent in this map unit are the poorly drained, silty Denny soils and the very poorly drained, silty Shiloh soils, which are mainly in depressions.

Corn, soybeans, and small grains grow well on the soils making up this map unit. Legumes and grasses

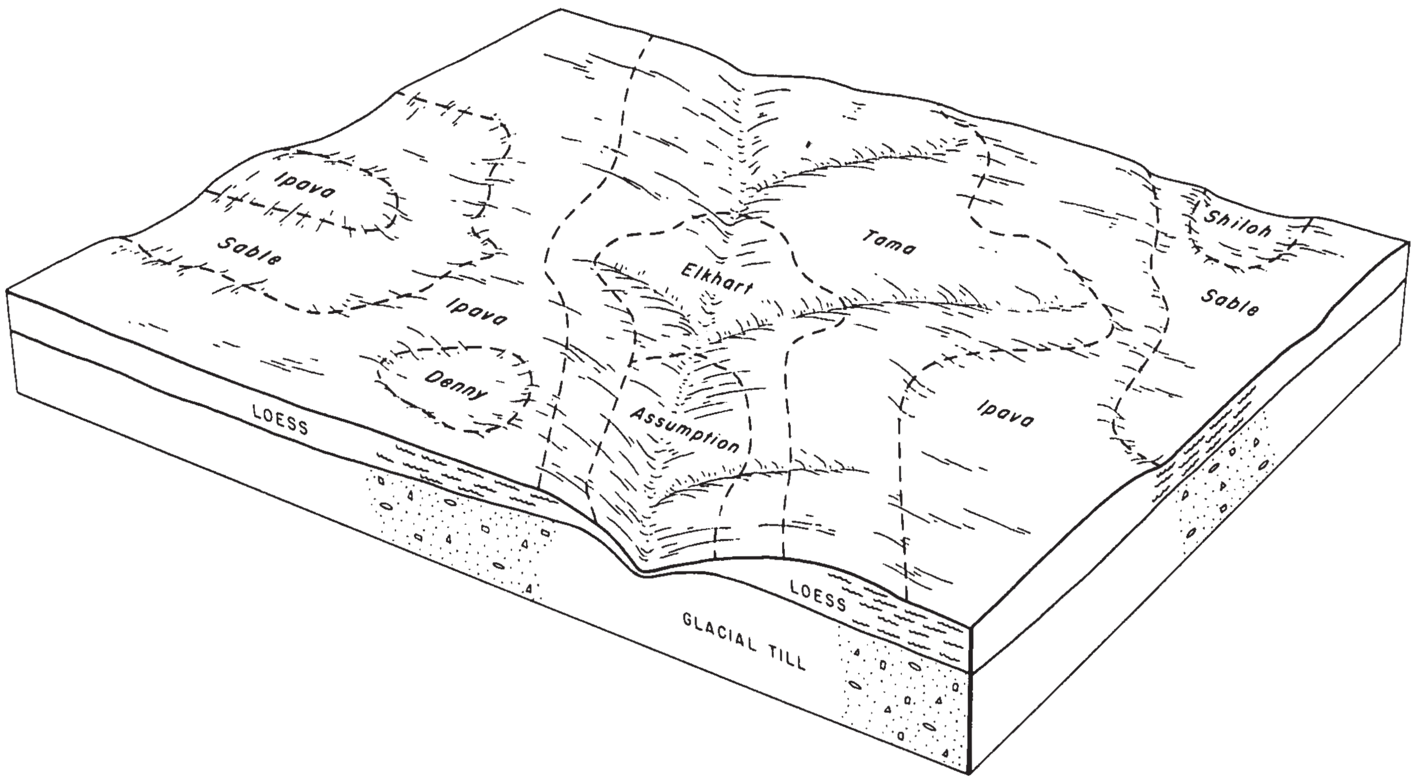


Figure 1.—Pattern of soils and underlying material in the Ipava-Tama-Sable map unit on the general soil map.

grow well where the soils are well drained and moderately well drained. The available water capacity is very high, and the natural fertility is high. The organic matter content is high in the Ipava and Sable soils and moderate in the Tama soils. The main concerns of management are improving drainage on Ipava and Sable soils, controlling water erosion on Tama soils, and maintaining tilth on Sable soils.

The soils of this map unit are used mainly for cultivated crops. Some of the sloping soils are used for hay crops and permanent pasture. The main enterprises are growing cash crops and, to a small extent, feeding beef cattle. The soils have good potential for the cultivated crops commonly grown in the county. Tama soils are well suited to vegetable crops and fruit trees.

Most of the soils have poor potential for use as sites for houses and as septic tank absorption fields. Slope, shrink-swell potential, and low strength are slight or moderate limitations to the use of Tama soils. Excess water, flooding, shrink-swell potential, and low strength are severe limitations to the use of Ipava and Sable soils.

2. Hartsburg-Sable

Nearly level, poorly drained, moderately permeable soils; on uplands

This map unit consists mainly of nearly level soils on loess-covered till plains. Shallow depressions and gently sloping ridges and knolls 5 to 10 feet in elevation are scattered throughout. The slope ranges from 0 to 2 percent (fig. 2).

This map unit makes up about 5 percent of the survey area. It consists of about 75 percent Hartsburg soils, 20 percent Sable soils, and 5 percent minor soils.

Hartsburg soils are nearly level and slightly depressional and are poorly drained. The surface soil typically is black silty clay loam. The subsoil is very dark gray, dark grayish brown, and grayish brown, mottled silty clay loam in the upper part; it is light brownish gray, mottled silt loam in the lower part. The underlying material is gray and brown, mottled, calcareous silt loam.

Sable soils are nearly level and slightly depressional and are poorly drained. The surface soil typically is black silty clay loam. The subsoil is dark grayish brown and grayish brown, mottled silty clay loam and silt loam. The underlying material is light brownish gray, mottled, calcareous silt loam.

Of minor extent in the map unit are the nearly level, somewhat poorly drained, silty Ipava soils, which are in slightly higher lying areas than the Hartsburg and Sable soils. Also of minor extent are the gently sloping, well drained, silty Tama soils on knolls and ridges.

Corn and soybeans grow well on the soils making up this map unit. The available water capacity is very high, and natural fertility is high. The organic matter content is high. The main concerns of management are improving drainage and maintaining tilth.

The soils of this map unit are used mainly for cultivated crops. In a few areas, they are used for pasture and hay crops. The main crops are cash crops. The soils have good potential for the cultivated crops commonly grown in the county.

The soils have poor potential for use as sites for buildings and sanitary facilities. Excess water and flooding are the main limitations.

3. Ipava-Virden

Nearly level, somewhat poorly drained and poorly drained, moderately slowly permeable soils; on uplands

This map unit consists mainly of nearly level soils on loess-covered till plains. Shallow depressions and gently sloping and moderately sloping ridges and knolls 5 to 30 feet in elevation are scattered throughout. Drainageways that have steeper side slopes are common. The slope ranges from 0 to 3 percent (fig. 3).

This map unit makes up about 22 percent of the county. It consists of about 40 percent Ipava soils, 25 percent Virden soils, and 35 percent minor soils.

Ipava soils are nearly level and are somewhat poorly drained. The surface soil typically is black silt loam and very dark gray silty clay loam. The subsoil is brown and grayish brown silty clay loam; it has yellowish brown mottles. The underlying material is yellowish brown and light brownish gray, calcareous silt loam.

Virden soils are nearly level and are poorly drained. The surface soil typically is black silty clay loam. The subsoil is very dark gray, olive gray, and light olive gray, mottled silty clay loam. The underlying material is light olive gray, yellowish brown, and light olive brown, calcareous silt loam.

The minor soils include the moderately sloping and strongly sloping, moderately well drained, silty Assumption soils on side slopes of drainageways; the gently sloping and moderately sloping, well drained, silty Tama soils on ridges and knolls; a few areas of moderately sloping and strongly sloping Tama soils along drainageways adjacent to Assumption soils; and poorly drained, silty Denny soils, which are mainly in depressions.

Corn and soybeans grow well on the soils making up this map unit. Legumes and grasses grow well in a few areas where the soils are moderately well drained and well drained. The available water capacity is very high,

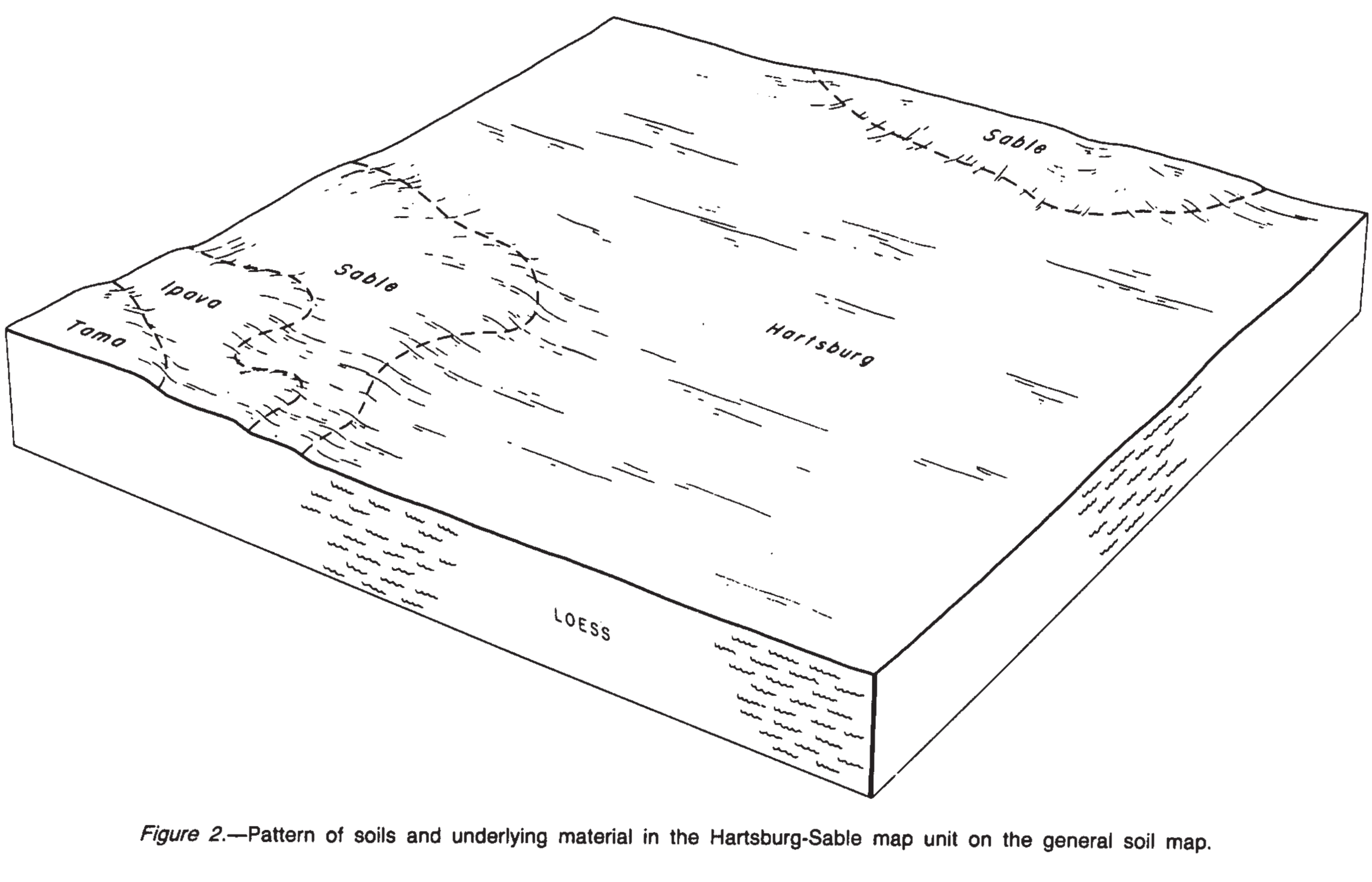


Figure 2.—Pattern of soils and underlying material in the Hartsburg-Sable map unit on the general soil map.

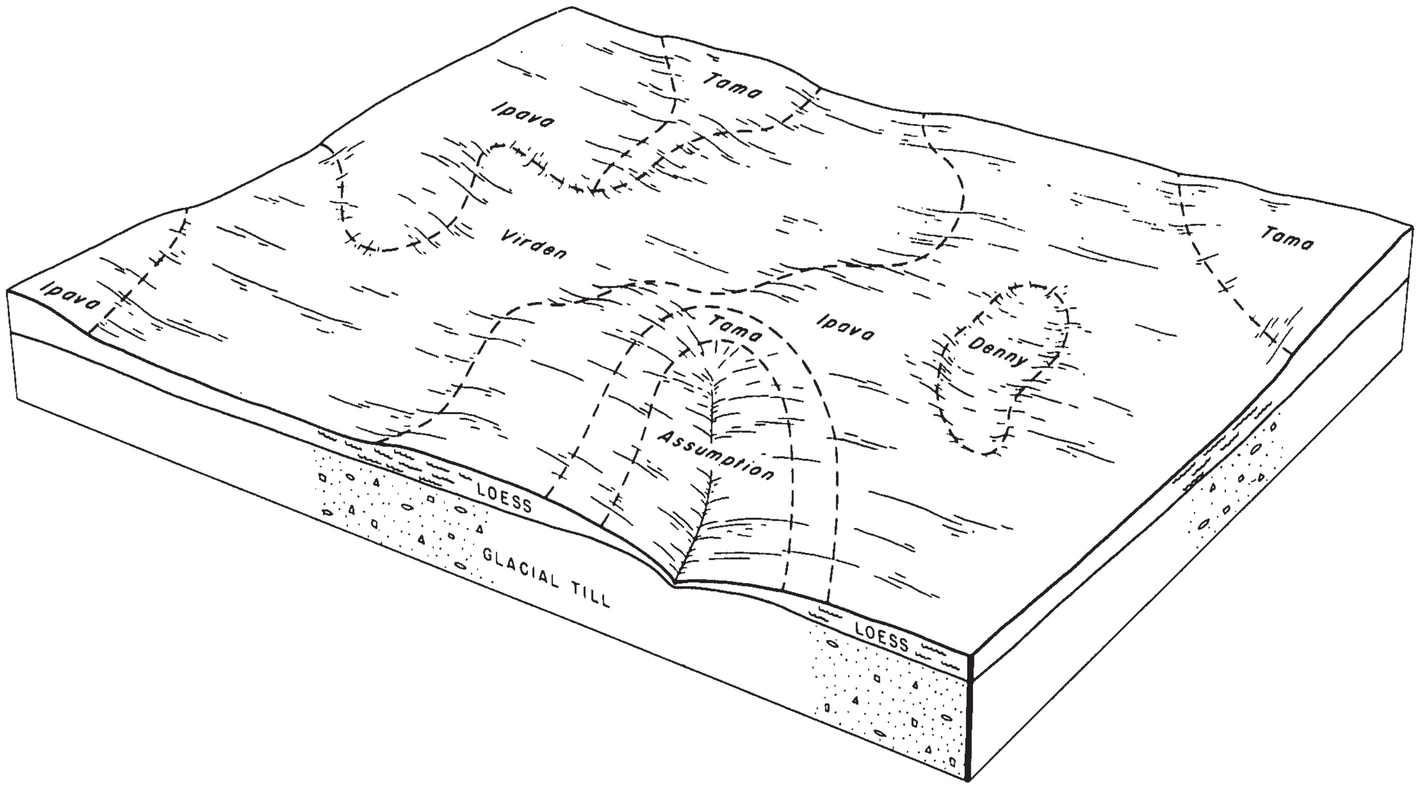


Figure 3.—Pattern of soils and underlying material in the Ipava-Virden map unit on the general soil map.

and natural fertility is high. The organic matter content is high. The main concerns of management are improving drainage on Ipava and Virden soils and maintaining tilth on Virden soils.

The soils of this map unit are used mainly for cultivated crops. Some of the sloping soils are used for hay crops and permanent pasture. The main enterprise is growing cash crops. The soils have good potential for the cultivated crops commonly grown in the county.

The soils have poor potential for use as sites for dwellings and as septic tank absorption fields. Excess water, flooding, low strength, permeability, and shrink-swell potential are the main limitations.

4. Fayette-Elco-Keomah

Nearly level to moderately steep, well drained to somewhat poorly drained, moderately permeable and moderately slowly permeable soils; on uplands

This map unit consists of soils on loess-covered till plains bordering the main streams and rivers of the county. Short drainageways that have moderately sloping to very steep side slopes highly dissect the area. Areas between the drainageways are narrow and nearly level to moderately sloping. The slope ranges from 0 to 18 percent (fig. 4).

This map unit makes up about 15 percent of the county. It consists of about 40 percent Fayette soils, 20 percent Elco soils, 15 percent Keomah soils, and 25 percent minor soils.

Fayette soils are gently sloping to strongly sloping and are well drained. The surface layer typically is dark grayish brown silt loam. The subsurface layer is brown silt loam. The subsoil is dark yellowish brown and yellowish brown silty clay loam in the upper part and yellowish brown, mottled silt loam in the lower part. The underlying material is yellowish brown, mottled silt loam.

Elco soils are strongly sloping and moderately steep and are moderately well drained. The surface soil typically is very dark grayish brown and brown silt loam. The subsoil is yellowish brown silty clay loam in the upper part, grayish brown and yellowish brown silty clay loam in the middle part, and gray, mottled loam in the lower part.

Keomah soils are nearly level and somewhat poorly drained. The surface soil is dark grayish brown, grayish brown, and light grayish brown silt loam. The subsoil is brown, mottled silty clay loam in the upper part, and grayish brown, mottled silty clay loam in the lower part. The underlying material is gray, mottled, calcareous silt loam.

The minor soils include the strongly sloping to very steeply sloping, well drained Hickory soils and the mod-

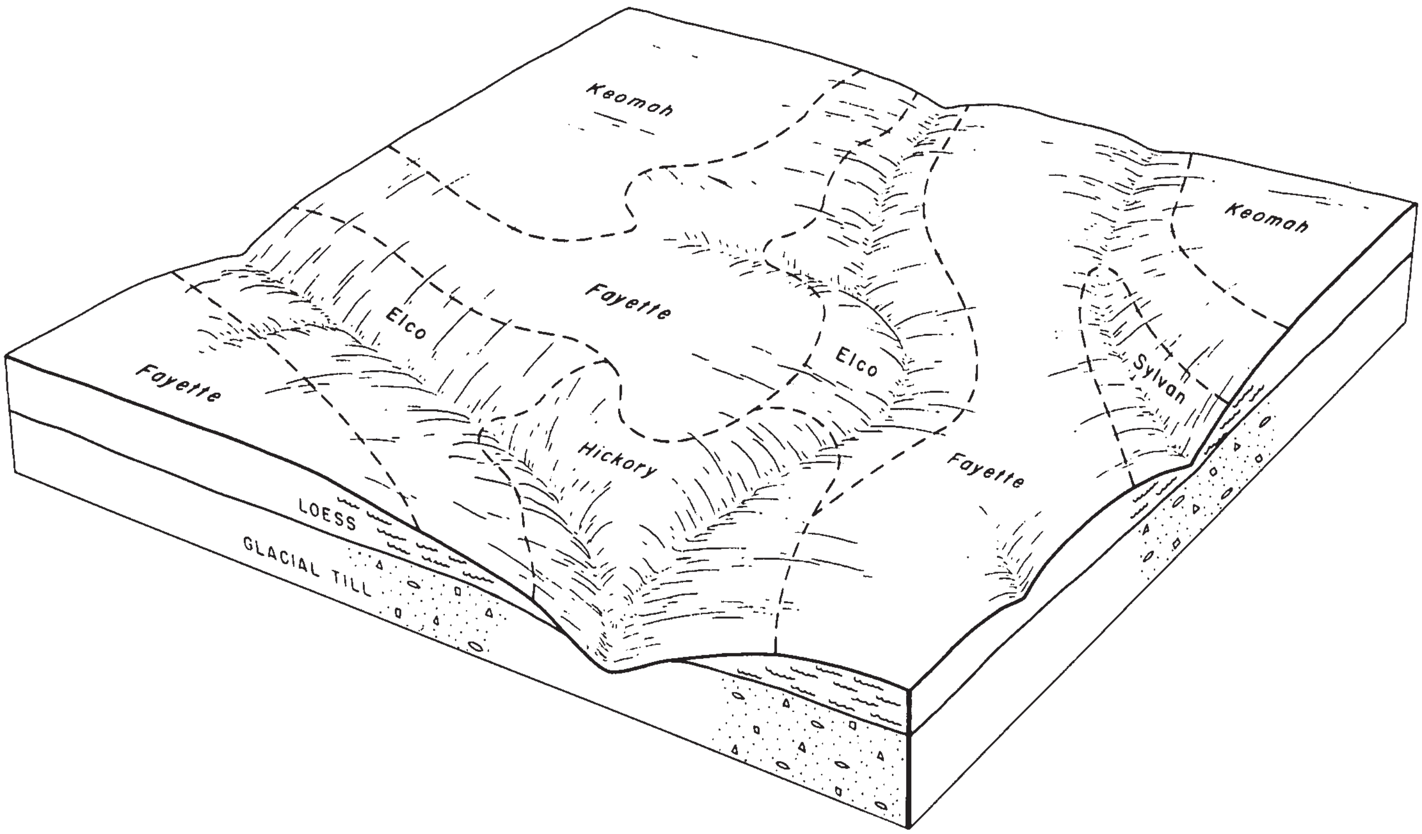


Figure 4.—Pattern of soils and underlying material in the Fayette-Elco-Keomah map unit on the general soil map.

erately sloping and strongly sloping, well drained Sylvan soils on side slopes along drainageways. Lake Springfield is also included in this map unit.

Corn, soybeans, and small grains grow well on the less sloping soils making up this map unit. Legumes and grasses grow well on Fayette and Elco soils. The growth of plant roots is restricted by excess water in Keomah soils. The available water capacity is high, and natural fertility is medium. The organic matter content is generally moderately low; it is low where the soils are eroded. The main concerns of management are controlling water erosion on the gently sloping to moderately steep soils, maintaining fertility, and maintaining tilth on the severely eroded soils.

The less sloping soils of this map unit are used mainly for cultivated crops. The moderately steep soils are used mainly for hay crops and pasture and as woodland and habitat for wildlife. The main crops are cash crops. The feeding of beef cattle and woodland production are of limited extent. The less sloping soils have good potential for the cultivated crops commonly grown in the county. The strongly sloping and moderately steep soils have good potential for hay and pasture. Fayette soils have good potential for fruit trees.

The soils of this map unit have good potential for use as woodland and good to fair potential for use as habitat for openland and woodland wildlife. Trees grow well on these soils. On the more sloping soils, however, water erosion is a hazard to new plantings. Established woodland can very effectively reduce erosion.

The soils have fair to poor potential for use as sites for dwellings and as septic tank absorption fields. Slope, the seasonal high water table, shrink-swell potential, low strength, and permeability are the main limitations.

5. Alvin-Middletown-Keomah

Nearly level to moderately steep, well drained and somewhat poorly drained, moderately permeable over rapidly permeable, and moderately slowly permeable soils; on uplands

This map unit consists mainly of loess and wind-blown sand on till plains in narrow areas bordering the Sangamon River and South Fork of the Sangamon River. Drainageways that have strongly sloping and moderately steep side slopes are common. Between the drainageways there are long, narrow, and gently sloping to strongly sloping ridges and knolls and other areas that are nearly level. The slope ranges from 0 to 20 percent (fig. 5).

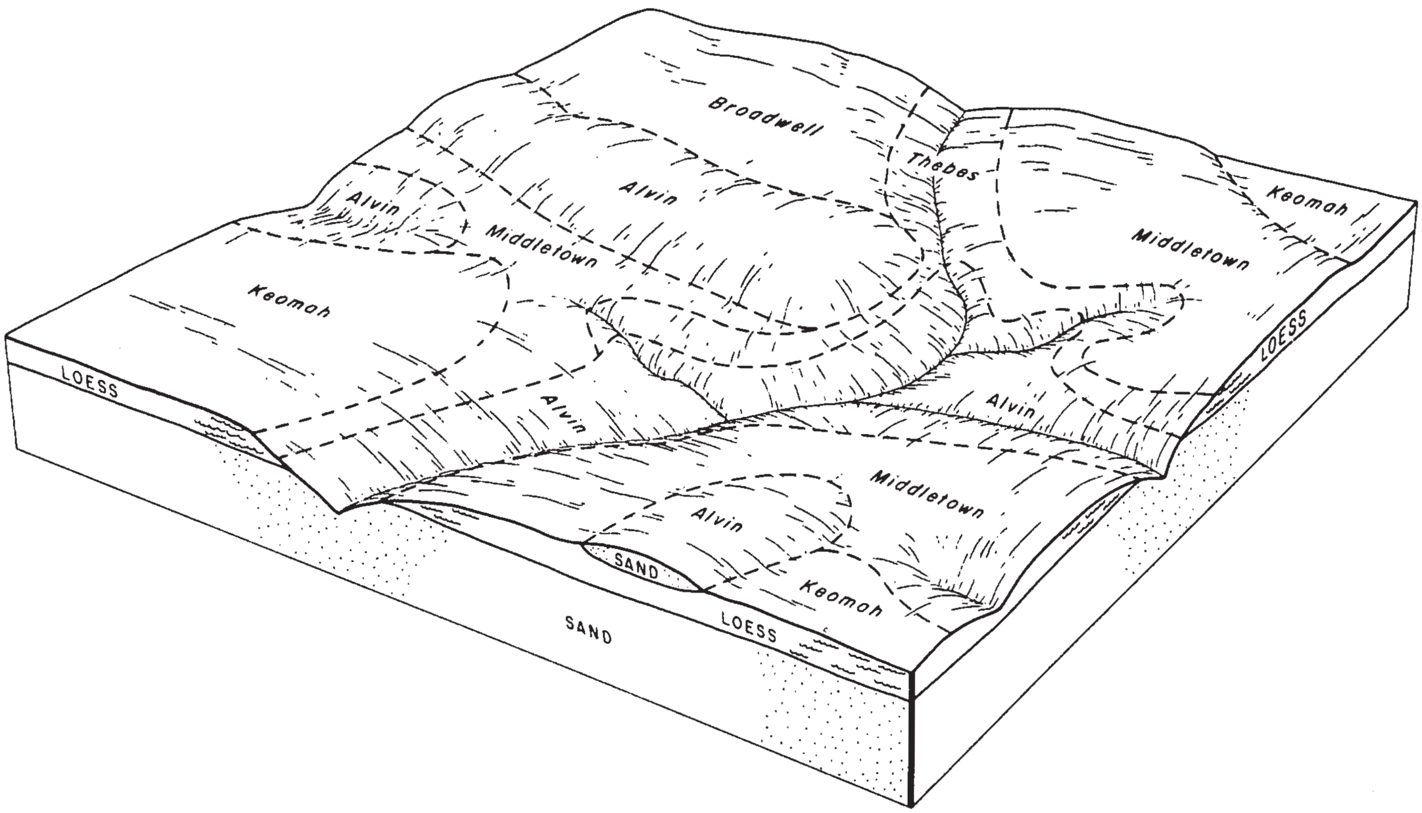


Figure 5.—Pattern of soils and underlying material in the Alvin-Middletown-Keomah map unit on the general soil map.

This map unit makes up about 2 percent of the county. It consists of about 35 percent Alvin soils, 30 percent Middletown soils, 15 percent Keomah soils, and 20 percent minor soils.

Alvin soils are moderately sloping to moderately steep and are well drained. The surface soil typically is dark brown loamy sand and sandy loam. The subsoil is strong brown and brown sandy loam and sandy clay loam in the upper part and strong brown and brown sandy loam and loamy sand in the lower part. The underlying material is strong brown loamy sand and sand.

Middletown soils are gently sloping and moderately sloping and are well drained. The surface soil typically is dark grayish brown and yellowish brown silt loam. The subsoil is dark yellowish brown silty clay loam in the upper part and dark yellowish brown clay loam and loamy fine sand in the lower part. The underlying material is dark yellowish brown fine sand.

Keomah soils are nearly level and somewhat poorly drained. The surface soil is dark grayish brown, grayish brown, and light grayish brown silt loam. The subsoil is mottled silty clay loam; it is brown in the upper part and grayish brown in the lower part. The underlying material is gray, mottled, calcareous silt loam.

The minor soils include the gently sloping and moderately sloping, well drained Broadwell soils on ridges between drainageways and the strongly sloping, well drained Thebes soils on side slopes along drainageways and on ridges.

Corn, soybeans, small grains, legumes, and grasses grow well on the Middletown and Keomah soils; however, excess water in the Keomah soils restricts the growth of roots of legumes and grasses. Alvin soils are less suited to these crops. The available water capacity is high in Middletown and Keomah soils, and it is moderate in Alvin soils. Natural fertility is medium. The organic matter content is moderately low in Middletown and Keomah soils and low in Alvin soils. The main concerns of management are controlling water erosion on Alvin and Middletown soils, maintaining fertility on all the soils, and controlling soil blowing on Alvin soils. Droughtiness is a limitation to the use of the Alvin soils as cropland.

The soils of this map unit are used mainly for cultivated crops. Some of the soils are used for hay crops and pasture, as woodland, and as habitat for wildlife. Sand is commonly excavated for use in construction. Some of the soils, at the north edge of Springfield, are used for urban and industrial development. The main enterprise is growing cash crops. The soils have good to fair potential for crops commonly grown in the county.

Most of the soils of this map unit have good potential for use as woodland and as habitat for openland and woodland wildlife. Trees grow well on the soils. On Alvin soils, however, water erosion and soil blowing are hazards to new plantings. Established woodland can very effectively reduce erosion.

Most of the soils have fair to poor potential for use as sites for dwellings and good to fair potential for use as septic tank absorption fields. Excessive slope, shrink-swell potential, and low strength are the main limitations for dwellings. Septic tank absorption fields work well in the less sloping Alvin and Middletown soils; but there is a hazard of contaminating nearby ground water. The Keomah soils have poor potential for use as sites for dwellings and as septic tank absorption fields because of shrinking and swelling, low strength, wetness, and permeability.

6. Sawmill-Radford-Tice

Nearly level, poorly drained and somewhat poorly drained, moderately permeable soils; on flood plains

This map unit consists mainly of nearly level soils on bottom land. Swales and former stream channels are widely scattered throughout the bottom land. The slope ranges from 0 to 3 percent (fig. 6).

This map unit makes up about 9 percent of the county. It consists of about 25 percent Sawmill soils, 20 percent Radford soils, 10 percent Tice soils, and 45 percent minor soils.

Sawmill soils are poorly drained. The surface soil typically is very dark gray and black silty clay loam. The subsoil is dark gray and grayish brown, mottled silty clay loam. The underlying material is grayish brown, mottled silty clay loam.

Radford soils are somewhat poorly drained. The surface soil typically is very dark grayish brown silt loam. The underlying material is very dark gray silt loam in the upper part and black silty clay loam in the lower part.

Tice soils are somewhat poorly drained. The surface soil typically is very dark grayish brown silty clay loam. The subsoil is dark grayish brown, mottled silty clay loam. The underlying material is dark brown and grayish brown loam.

The minor soils include the nearly level, somewhat poorly drained Lawson soils on flood plains; the nearly level and gently sloping, well drained Plano soils on long and narrow ridges on terraces; the well drained Camden soils that are nearly level and gently sloping on terraces and strongly sloping on ridges and the edges of terraces; the well drained Ross soils mainly on long and narrow natural levees adjacent to the Sangamon River and the South Fork of the Sangamon River; and the poorly drained Sexton soils in shallow depressions on terraces along the major streams.

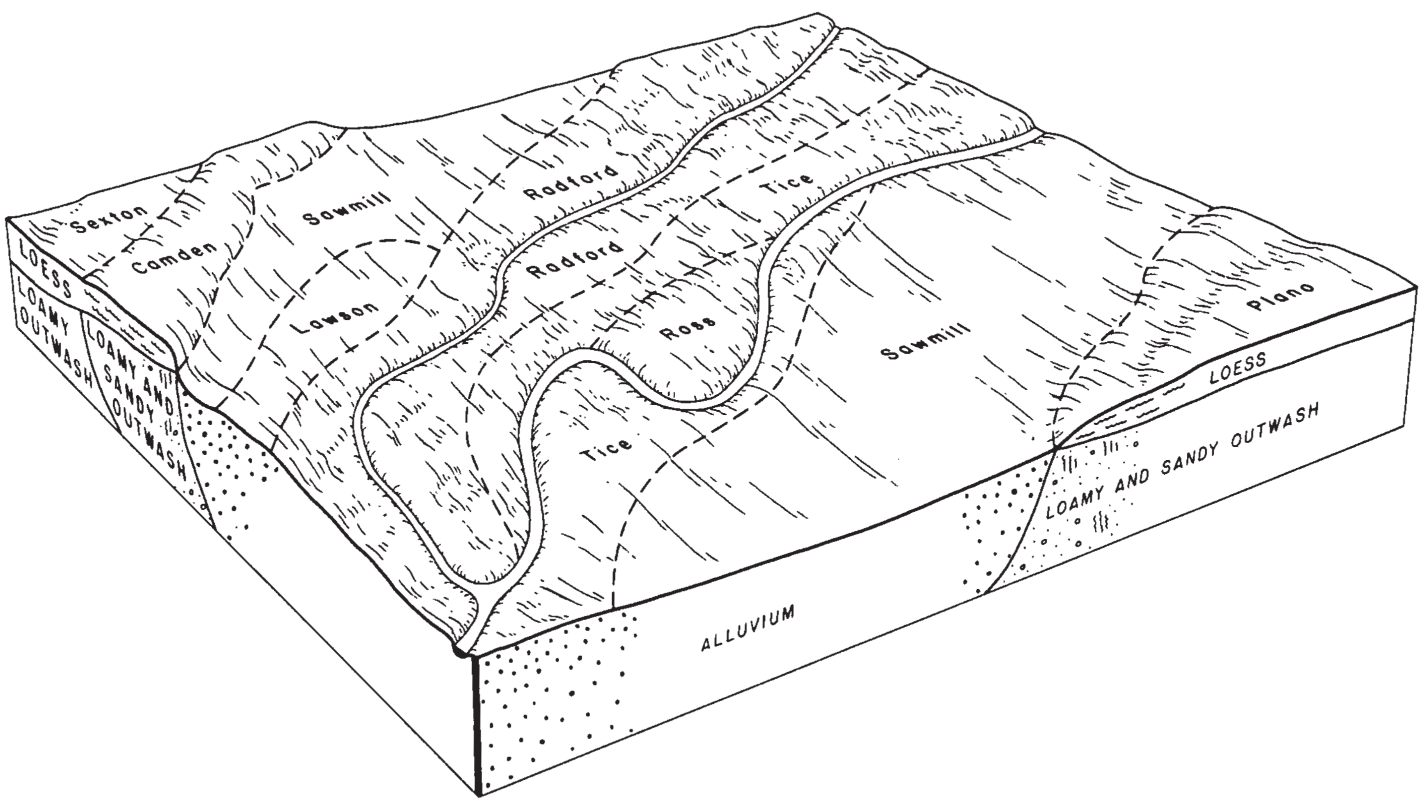


Figure 6.—Pattern of soils and underlying material in the Sawmill-Radford-Tice map unit on the general soil map.

Corn, soybeans, and small grains grow well on the soils making up this map unit. The root growth of grasses and legumes is restricted by excess water. The available water capacity is very high in the Sawmill and Radford soils and high in the Tice soils. Natural fertility is high. The organic matter content is moderate in the Tice soils and high in the other soils. The main concerns of management are protecting the soils from flooding, improving drainage, and maintaining fertility. In a few places, the bottom land soils are protected from flooding by levees. Another concern of management is scouring by water on flood plain soils.

The soils of this map unit are used mainly for cultivated crops. In a few areas, they are used for permanent pasture and as woodland. The main crops are cash crops. The soils have good potential for the cultivated crops commonly grown in the county.

The soils of this map unit have poor potential for use as building sites and as sites for sanitary facilities. Wetness and flooding are severe hazards.

Broad land use considerations

The soils of Sangamon County vary widely in their potential for major land uses. In 1967, about 71 percent of the land in the county was used for cultivated crops, mainly corn and soybeans (*7*). The soils in map units 1, 2, 3, and 6 have good potential for crops, and they are used mainly as cropland. Wetness is the major limitation; flooding, mainly in the spring, is an additional limitation to the use of the soils in map unit 6. The hazard of erosion is the main limitation for crops on sloping Tama soils in map unit 1.

The soils in map units 4 and 5 have fair potential for crops, and they are commonly used as cropland. The hazard of erosion is the main limitation for crops on sloping soils. Elco, Fayette, Keomah, and Middletown soils are the main soils used for cultivated crops in map units 4 and 5.

About 8 percent of the land in the county was in pasture in 1967. The soils in map units 1, 4, and 5 have good potential for grasses and legumes.

About 6 percent of the county was woodland in 1967. The soils in map units 4 and 5 have good potential for this use. The main limitations are the hazard of erosion and competing vegetation, mainly in areas of small seedlings. Some of the soils have a moderate equipment limitation because of excessive slopes.

About 9 percent of the land in the county was classified as urban land in 1967. In general, areas of gently sloping Tama soils and gently sloping and moderately sloping Alvin, Fayette, and Middletown soils have the best potential for urban uses. These soils are mainly in map units 1, 4, and 5. Other soils in these map units have limitations of slope, wetness, high frost-action potential, and low strength. The soils in map units 2 and 3 have poor potential for urban development because of wetness, high frost-action potential, and moderate to high shrink-swell potential. The soils in map unit 6 are on flood plains and have poor potential for urban development because of flooding and wetness.

The potential for recreation uses ranges from good to poor. The less sloping Alvin, Fayette, Middletown, and Tama soils in map units 1, 4, and 5 have good potential for most recreation uses. The other soils in these map units are limited for intensive recreation uses such as playgrounds and camp areas by wetness and slope; they are, however, suitable for extensive recreation uses such as hiking or horseback riding. The soils in map units 2, 3, and 6 have poor potential for recreation uses because of wetness and flooding.

The potential for openland wildlife habitat is good throughout the county. Most of the soils in map units 4 and 5 have good potential for woodland wildlife habitat; the soils in map units 1, 2, 3, and 6 have fair to good potential. The soils in all the map units have fair to poor potential for wetland wildlife habitat. Some of the map units, especially map unit 6, contain small areas of water, which are suitable for wetland wildlife habitat.

Soil maps for detailed planning

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

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

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil, a brief description of the soil profile, and a listing of the principal hazards and limitations to be considered in planning management.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. 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, Elco silt loam, 7 to 15 percent slopes, is one of several phases in the Elco series.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land 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 map units are made up of two or more major soils or one or more soils and a miscellaneous area. These map units are called soil complexes. The soils making up a complex, and the miscellaneous area if included, occur 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 and miscellaneous area are somewhat similar in all areas. Urban land-Ipava complex 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.

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

8D3—Hickory clay loam, 7 to 12 percent slopes, severely eroded. This is a strongly sloping, well drained soil on side slopes along drainageways. Individual areas of this soil are commonly long and range from 5 to 100 areas in size.

Typically, the surface layer is dark yellowish brown clay loam about 6 inches thick. The subsoil is clay loam, and it is about 50 inches thick. The upper part is dark yellowish brown or yellowish brown, and the lower part is olive brown mottled with gray. The underlying material to a depth of 70 inches is olive brown and yellowish brown, mottled loam. In a few areas, the surface layer is dark grayish brown silt loam or loam. In other areas, the subsoil is less sandy than is typical. In a few places, the entire subsoil is mottled gray.

Included with this soil in mapping are small areas of moderately deep Gosport soils, which are on the steeper side slopes below this Hickory soil. A few areas of somewhat poorly drained Lawson and Radford soils are also included. These soils are on the bottom of drainageways that are too narrow to be indicated on the soil maps. The included soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The organic matter content and natural fertility are low. The subsoil is strongly acid to neutral. The surface of this soil crusts after rains, and clods form if this soil is cultivated when it is wet. The potential is moderate for frost action in this soil and for shrinking and swelling.

In most areas, this soil is cultivated or is used for pasture or hay. This soil has poor potential for cultivated crops and fair potential for pasture and hay. It has good potential for woodland use and for habitat for openland and woodland wildlife, fair to poor potential for recreation uses, and fair potential for building site development and septic tank absorption fields.

This soil is poorly suited to corn, soybeans, and small grains. If these crops are grown, erosion is a severe hazard. Conservation tillage, conservation cropping systems, and winter cover crops help to reduce soil loss. In many places, diversions are used to control runoff. A good seedbed is difficult to prepare because of the excessive clay in the surface layer. Adding crop residue and other organic material to the surface helps to reduce crusting and to increase infiltration.

This soil is suited to pasture and hay. The pasture plants and the hay help to reduce erosion. Proper fertilization helps to establish seedlings and to maintain good plant growth. Pasture rotation and timely deferment of grazing can help to keep the soils and the pasture in good condition. Restricting grazing when the soil is wet helps to reduce surface compaction.

This soil is well suited to use as woodland. Controlling the competing vegetation is the main management concern. The competing vegetation can be controlled by carefully preparing the site before planting. Later, competition can be controlled by spraying and cutting. Machinery for planting trees should be used only when the surface layer is dry.

This soil is well suited to habitat for openland and woodland wildlife if erosion is controlled. New plantings are difficult to establish because of excessive clay in the surface layer.

This soil is suited to use as septic tank absorption fields. Excessive slope and the moderate permeability are moderate limitations to this use. These limitations can be overcome by increasing the size of the absorption field and by placing the tile on the contour. This soil is not suited to use as sewage lagoons because of excessive slope. It is suited to use as a sanitary landfill, but the excessive slope and excessive clay in this soil are moderate limitations to this use.

This soil is suited to use as sites for small buildings. Buildings need to be designed to withstand the shrinking and swelling of the soil. For local roads and streets, the use of suitable base material can increase the strength of roadbeds. In areas of new construction, erosion is a severe hazard. Adding organic material to the surface and establishing a vegetative cover as soon as possible help to reduce this hazard.

This map unit is in capability subclass IVe.

8E—Hickory silt loam, 12 to 18 percent slopes. This is a moderately steep, well drained soil on side slopes along drainageways. Individual areas of this soil are commonly long and range from 5 to 75 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 54 inches thick. It is dark yellowish brown and olive brown silt loam and clay loam in the upper part and olive brown loam in the lower part. The underlying material to a depth of 70 inches is light olive brown and dark yellowish brown; calcareous loam. In places, the subsoil is less sandy than is typical, and carbonates are at a depth of 40 inches. There are small areas of a severely eroded Hickory soil that has a dark brown clay loam surface layer.

Included with this soil in mapping are small areas of moderately deep Gosport soils and a few areas of somewhat poorly drained Lawson and Radford soils on the bottom of drainageways. The included soils make up 10 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The organic matter content is moderately low, and natural fertility is low. The subsoil is strongly acid to neutral. The potential is moderate for frost action and for shrinking and swelling.

In most areas, this soil is used as woodland or for pasture. This soil has poor potential for cultivated crops and fair potential for pasture and hay. It has good potential for use as woodland. It has fair to good potential for openland and woodland wildlife habitat, poor potential for recreation uses, and poor potential for building site development and sanitary facilities.

This soil is suited to pasture and hay. The pasture plants and the hay help to reduce soil loss (fig. 7). Proper fertilization can help to establish seedlings and to maintain good plant growth. Pasture rotation and timely deferment of grazing can help to keep the soil and the pasture in good condition.

This soil is well suited to woodland use. The erosion hazard and equipment limitation are moderate on the

Figure 7.—The cover of grasses and legumes helps to reduce erosion in this area of Hickory silt loam, 12 to 18 percent slopes. Cultivable Fayette soils are on the ridge in the background.

steeper slopes. Plant competition can be controlled by good site preparation before planting. Later, competition can be controlled by spraying and cutting. Care must be taken if machines are used for planting and harvesting trees.

This soil is well suited to habitat for woodland wildlife. Forage plants, trees, and herbs provide good food and cover.

In areas of new construction where this soil is disturbed, erosion is a severe hazard. Applying organic material to the surface and establishing a vegetative cover as soon as possible help to reduce soil loss.

This map unit is in capability subclass VIe.

8E3—Hickory clay loam, 12 to 18 percent slopes, severely eroded. This is a moderately steep, well drained soil on side slopes along drainageways. Individual areas of this soil are long and range from 5 to 100 acres in size.

Typically, the surface layer is dark yellowish brown clay loam about 6 inches thick. The subsoil is about 40 inches thick. It is yellowish brown clay loam in the upper part and olive brown, mottled loam in the lower part. The underlying material to a depth of 70 inches is olive brown and yellowish brown, calcareous loam. In places, the subsoil is less sandy than is typical, and carbonates are at a depth of 30 inches. In places, the surface layer is dark grayish brown silt loam about 6 inches thick. In some areas, slope is more than 18 percent.

Included with this soil in mapping are small areas of moderately deep Gosport soils. The Gosport soils are commonly on steep side slopes below this soil. Also included are small areas of somewhat poorly drained Lawson and Radford soils. These soils are on the bottom of drainageways that are too narrow to indicate on the soil maps. The included soils make up about 10 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The organic matter content and natural fertility are low. The subsoil is strongly acid to neutral. The potential is moderate for frost action and for shrinking and swelling. The surface of this soil crusts after rains, and clods form if this soil is cultivated when wet.

In most areas, this soil is used for pasture. In a few areas, it is cultivated or used as woodland. This soil has poor potential for cultivated crops and fair potential for pasture and hay. It has good potential for use as woodland and as habitat for woodland wildlife. It has poor potential for recreation uses and for building site development and sanitary facilities.

This soil is suited to pasture and hay. The pasture plants and the hay help to reduce soil loss. Erosion is difficult to control because of excessive slope. In places, diversions can be used to control runoff. A good seedbed is difficult to prepare because of the excessive clay in the surface layer. Proper fertilization helps to establish seedlings and to maintain good plant growth. Pasture rotation and timely deferment of grazing can help to keep the soil and the pasture in good condition. Restricting grazing when the soil is wet helps to reduce surface compaction.

This soil is suited to use as woodland. The hazard of erosion and the equipment limitations are moderate on the steeper slopes. Plant competition can be controlled by good site preparation before planting. Later, competition can be controlled by spraying and cutting. Because of excessive slopes, care must be taken if machines are used for planting and harvesting trees. Machinery should be used only when the surface of the soil is dry.

This soil is suited to habitat for woodland wildlife. Erosion is a hazard. New plantings of grain, grass, and legumes are difficult to establish because of the excessive clay in the surface layer and the slope of the soil.

The slope and the low strength severely limit this soil for use as sites for roads and streets. The use of suitable base material helps to increase the strength of roadbeds.

In areas of new construction, erosion is a severe hazard; but, adding organic material to the surface and establishing a vegetative cover as soon as possible can help to reduce the hazard.

This map unit is in capability subclass VIe.

8F—Hickory silt loam, 18 to 50 percent slopes. This is a steep and very steep, well drained soil on side slopes along drainageways. Individual areas of this soil are long and range from 5 to 150 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 6 inches thick. The subsoil is about 40 inches thick. It is dark yellowish brown and yellowish brown clay loam in the upper part and light olive brown loam in the lower part. The underlying material to a depth of 70 inches is light olive brown and yellowish brown loam. In places, the subsoil is less sandy than is typical, or carbonates are at a depth of 20 inches. In small areas, the soil is severely eroded and has a dark brown clay loam surface layer. In other areas, the surface layer and subsurface layer are loam.

Included with this soil in mapping are small areas of moderately deep Gosport soils. The Gosport soils are on side slopes below this Hickory soil. Also included are small areas of somewhat poorly drained Lawson and Radford soils. These soils are on the bottom of drainageways that are too narrow to be shown on the soil maps. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The organic matter content is moderately low, and natural fertility is low. The subsoil is strongly acid to neutral. The potential is moderate for frost action and for shrinking and swelling.

In most areas, this soil is used as woodland or pasture. This soil has poor potential for cultivated crops, recreation uses, building site development, and sanitary facilities. It has fair potential for pasture and good potential for woodland and for woodland wildlife habitat.

This soil is suited to pasture. Overgrazing reduces forage production and causes surface compaction, excessive runoff, and erosion. Proper stocking rates, fertilization, rotation grazing, and deferred grazing help keep the soil and the pasture in good condition and help maintain productivity and reduce soil loss.

This soil is well suited to use as woodland. The erosion hazard and equipment limitations are moderate or severe. Tree seeds and seedlings grow well after they are established. Plant competition can be controlled by spraying, cutting, or girdling. Slopes are commonly too steep for the use of machines in planting trees. The trees have to be planted by hand. Because of the steep slopes, special care must be taken when operating harvesting equipment.

This soil is well suited to use as habitat for woodland wildlife.

This map unit is in capability subclass VIe.

17—Keomah silt loam. This is a nearly level, somewhat poorly drained soil on broad, flat areas on uplands. Individual areas of this soil are irregular in shape and range from 3 to 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is grayish brown and light grayish brown silt loam about 4 inches thick. The subsoil is silty clay loam about 35 inches thick. It is brown and mottled in the upper part and mottled, grayish brown in the lower part. The underlying material to a depth of 60 inches is gray, mottled, calcareous silt loam. In places, the surface layer is very dark grayish brown. In a few depressions, this soil is poorly drained and has a gray subsurface layer about 6 inches thick. In a few places, the slope is more than 2 percent.

Included with this soil in mapping are small areas of well drained Fayette soils and Middletown soils. These soils are more sloping and are on knolls or in raised areas. The included soils make up 2 to 10 percent of the map unit.

Water and air move through this soil at a moderately slow rate. Surface runoff is slow in cultivated areas. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is strongly acid to neutral. The potential is high for frost action and for shrinking and swelling. During the wet season, the water table is within 2 to 4 feet of the surface.

In most areas, this soil is cultivated. In a few areas it is used for pasture or as woodland. This soil has good potential for cultivated crops, hay, pasture, and woodland use. It has poor potential for building site development and sanitary facilities.

This soil is suited to corn, soybeans, and small grains. Wetness is a hazard for cultivated crops; however, properly graded ditches can help to remove surface water, and tile drains can help to reduce excess water in this soil. Returning crop residue to the soil and adding other organic material help to maintain fertility and the organic matter content.

This soil is suited to use as woodland. However, only trees that have a tolerance for wetness should be planted because excessive water restricts the growth of roots. Plant competition is a moderate limitation. The undesirable vegetation can be controlled by spraying and cutting.

The moderately slow permeability and excessive water are severe limitations for septic tank absorption fields. In a few places, surface ditches have been successfully used to remove water from sanitary landfills. Tile drains should be placed around the basements of dwellings and small buildings to remove excess water. Footings and foundations should be designed to withstand the shrinking and swelling of the soil. Roadbeds on this soil need proper base material to reduce damage resulting from frost action in the soil.

This map unit is in capability subclass IIw.

19C2—Sylvan silt loam, 4 to 7 percent slopes, eroded. This is a moderately sloping, well drained soil on side slopes along drainageways and on a few ridges between drainageways. Individual areas of this soil are commonly long and range from 3 to 50 acres in size.

Typically, the surface layer is brown or dark brown silt loam about 7 inches thick. The subsoil is silty clay loam about 22 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown. The underlying material to a depth of 60 inches is light brownish gray and yellowish brown, calcareous silt loam. In some places, the subsoil is thicker than is typical, and carbonates are at a depth of more than 40 inches. In other places, the upper part of the subsoil has been mixed with the surface layer by plowing, and the surface layer is dark yellowish brown silty clay loam. In a few areas, the slopes are as steep as 12 percent. In places, the surface layer is dark grayish brown silt loam about 7 inches thick. In some areas, the subsoil is thinner than is typical, and calcareous silt loam is at a depth of 10 inches. In a few areas, glacial till is in the lower part of the solum.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is medium. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is medium acid to slightly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, pasture, and woodland. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. If the soil is used for cultivated crops, there is a hazard of further erosion. Conservation tillage, terraces, contour farming, conservation cropping systems, and crop residue use help to reduce soil loss. Returning crop residue to the soil and adding other organic material to the soil help to improve fertility and to increase water infiltration.

The use of this soil for pasture or hay is effective in controlling erosion. The soil is especially well suited to alfalfa. Proper fertilization helps to establish seedlings and to maintain good growth. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition.

This soil is well suited to use as woodland. Tree seeds and seedlings survive and grow well if competing vegetation is controlled or removed. Competing vegetation can be controlled by spraying or cutting. There are no hazards or limitations to planting or harvesting trees.

This soil is suited to use as sites for buildings if the footings and foundations are designed to offset the shrinking and swelling of the soil and the low strength of the soil. It is well suited to use as septic tank absorption fields.

This soil can be used as sites for roadbeds if proper base material is used to prevent damage from frost action.

Erosion is a hazard in areas of new construction. Adding organic material to the surface and establishing a vegetative cover as soon as possible help to reduce soil loss.

This map unit is in capability subclass IIIe.

19D—Sylvan silt loam, 7 to 12 percent slopes. This is a strongly sloping, well drained soil on side slopes along drainageways and on a few ridges between drainageways. Individual areas of this soil are long and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is brown silt loam about 5 inches thick. The subsoil is silty clay loam. It is about 24 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown. The underlying material to a depth of 60 inches is yellowish brown and brownish gray, calcareous silt loam. In some places, the subsoil is thicker than is typical, and carbonates are at a depth of more than 40 inches. In some places, the upper part of the subsoil has been mixed with the surface layer by plowing, and the surface layer is dark yellowish brown silty clay loam. In a few areas, the slope is less than 7 percent or more than 12 percent. Also, in a few areas the surface layer is very dark grayish brown and about 5 inches thick. In places, glacial till is in the lower part of the subsoil.

Water and air move through this soil at a moderate rate. Surface runoff is medium. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is medium acid to slightly acid. The frost-action potential is high, and the shrink-swell potential is moderate.

In most areas, this soil is used as woodland or for pasture. This soil has fair potential for cultivated crops and good potential for hay, pasture, and woodland. It has fair potential for building site development and septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains. There is an erosion hazard because of slope. However, conservation tillage, terraces, contour farming, conservation cropping systems and crop residue management help to reduce soil loss. Returning crop residue to the soil and adding organic material help to increase water infiltration and to improve fertility.

This soil is well suited to grasses and legumes, especially alfalfa, for pasture and hay. A good cover of these crops is very effective in controlling erosion. Seedlings are easily established and grow well if the seedbed is properly fertilized. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition.

This soil is suited to woodland use. In newly planted areas, erosion is a hazard. A plant cover should be established as soon as possible. In some areas, diversions can be used to control runoff.

Because of slope, this soil is moderately limited for use as septic tank absorption fields and severely limited for use as sites for sewage lagoons. Placing septic tank absorption fields on the contour helps to overcome problems associated with slope.

The footings and foundations of buildings and dwellings need to be designed to offset the shrinking and swelling and low strength of the soil. Slope is a severe limitation to the construction of small commercial buildings. For local roads and streets, the use of proper base material helps to increase the strength of the roadbed and reduce the damage resulting from frost action.

In areas of new construction, erosion is a severe hazard. Erosion can be controlled by applying organic material to the surface of the soil and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IIIe.

19D3—Sylvan silty clay loam, 7 to 12 percent slopes, severely eroded. This is a strongly sloping, well drained soil on side slopes along drainageways and on ridges between drainageways. Individual areas of this soil are long and range from 3 to 100 acres in size.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil is yellowish brown silty clay loam about 18 inches thick. The underlying material to a depth of 60 inches is yellowish brown and light brownish gray, calcareous silt loam. In places, the subsoil is thicker than is typical, and calcareous silt loam is below a depth of 40 inches. In areas where erosion is less severe, the surface layer is dark grayish brown silt loam. In a few areas, the slope is less than 7 percent. Also, in a few areas, calcareous silt loam is at a depth of less than 20 inches. In some places, the subsoil is more sandy than is typical.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is rapid. The available water capacity is high. The organic matter content is low because of severe erosion, and natural fertility is medium. The subsoil is medium acid to neutral. The potential is high for frost action and moderate for shrinking and swelling. The surface layer crusts after rains, and clods form if this soil is cultivated when it is wet.

In most areas, this soil is cultivated. In a few areas, it is used for pasture and hay. This soil has poor potential for cultivated crops and fair potential for hay and pasture. It has good potential for woodland use, fair potential for most recreation uses, and fair potential for building site development and septic tank absorption fields. It has good potential for habitat for openland and woodland wildlife.

This soil is poorly suited to corn, soybeans, and small grains. Erosion is difficult to control. A good seedbed is difficult to prepare because of surface crusting and clods. Conservation tillage, terraces, contour farming, conservation cropping systems, and crop residue management help to reduce soil loss. Returning crop residue to the soil and adding organic material help to increase water infiltration, reduce crusting, and improve fertility.

The use of this soil for pasture and hay is effective in controlling erosion. Grasses and legumes, especially alfalfa, grow well. Seedlings grow well if seedbeds are properly prepared and fertilized. Proper stocking rates and pasture rotation help to keep pasture plants in good condition. Restricting grazing when the soil is wet helps to reduce surface compaction and runoff.

This soil is suited to use as woodland. In newly planted areas erosion is a serious hazard. As soon as possible, organic matter should be applied to the surface of the soil and a plant cover should be established. In some areas, diversions can be used to control runoff.

This soil is well suited to habitat for openland and woodland wildlife. Grains, grasses, legumes, and herbs provide good food and cover.

This soil is moderately limited for use as septic tank absorption fields by slope. Placing the tile on the contour helps overcome this limitation.

The footings and foundations of buildings and dwellings should be designed to offset the shrinking and swelling and low strength of the soil. The steepness of slope is a severe limitation to the construction of small commercial buildings. For local roads and streets the use of proper base material can help to increase the strength of roadbeds and help to reduce damage from frost action.

In areas of new construction, erosion is a severe hazard. Erosion can be controlled by applying organic material to the surface of the soil and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IVe.

19E3—Sylvan silty clay loam, 12 to 18 percent slopes, severely eroded. This is a moderately steep, well drained soil on side slopes along drainageways and on ridges between drainageways. Individual areas of this soil are long and range from 5 to 75 acres in size.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil is yellowish brown, and it is about 16 inches thick. The upper part is silty clay loam, and the lower part is silt loam. The underlying material to a depth of 60 inches is light brownish gray and yellowish brown, calcareous silt loam. In some places, the subsoil is thicker than is typical, and calcareous silt loam is at a depth of more than 40 inches. In areas where erosion is less severe, the surface layer is dark grayish brown silt loam. In a few areas, the entire soil is calcareous silt loam. Also, in a few areas slopes are steeper than 18 percent. In some places, the subsoil is more sandy than is typical.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The organic matter content is low because of severe erosion, and natural fertility is medium. The subsoil is medium acid to neutral. The potential is high in this soil for frost action and moderate for shrinking and swelling. The surface layer crusts after rains, and clods form if this soil is cultivated when it is wet.

In most areas, this soil is cultivated. In a few areas, it is used for pasture and hay. This soil has poor potential for cultivated crops and fair potential for pasture and as habitat for openland and woodland wildlife. It has good potential for trees and poor potential for most recreation uses and for building site development and sanitary facilities.

This soil is not suited to corn, soybeans, and small grains. Erosion is a severe hazard and is very difficult to control.

This soil is suited to pasture. A good vegetative cover helps to control erosion. Because the surface layer crusts and clods form, a good seedbed is difficult to prepare. Proper fertilization helps to establish seedlings and to maintain good plant growth. Proper stocking rates and pasture rotation help to keep pasture plants in good condition. Restricting grazing when the soil is wet helps to reduce surface compaction and surface runoff.

This soil is suited to use as woodland, although erosion is a hazard in areas of new tree plantings. Adding organic material to the surface and establishing a vegetative cover as soon as possible help to control erosion. Competing vegetation can be controlled by spraying and cutting. Because of the slope, mechanical planters or harvesters should be operated carefully.

This soil provides habitat for openland wildlife. Because of the slope, erosion is a hazard, which must be overcome if grains, grasses, and legumes are planted for food and cover.

The use of proper base material can help increase the strength of roadbeds and reduce damage from frost action.

Erosion is a severe hazard in areas of new construction. Adding organic material to the surface and establishing a vegetative cover as soon as possible can help reduce this hazard.

This map unit is in capability subclass VIe.

36A—Tama silt loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on upland flats. Individual areas are irregular in shape and range from 2 to 150 acres in size.

Typically, the surface layer is very dark gray silt loam about 12 inches thick. The subsurface layer is dark brown silt loam about 5 inches thick. The subsoil is about 40 inches thick. It is dark brown and dark yellowish brown silty clay loam in the upper part; yellowish brown, mottled silty clay loam in the middle part; and yellowish brown, mottled silt loam in the lower part. The underlying material to a depth of 68 inches is yellowish brown and light brownish gray, calcareous silt loam. In places, the subsoil is thinner than is typical, and calcareous silt loam is at a depth of 40 inches. In a few areas, this soil has slopes that are more than 2 percent.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils. They are in low-lying areas, and they make up about 5 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content is moderate, and natural fertility is high. The subsoil is slightly acid to strongly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, small grains, pasture, and hay. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, and small grains. Soil blowing is a slight hazard. Conservation tillage and the use of crop residue help to reduce soil blowing.

This soil is suited to most types of onsite sewage disposal systems. Effluent seepage from sewage lagoons is a hazard. Sealing the bottom of the lagoons helps to reduce seepage.

This soil is suited to use as sites for small buildings if the footings and foundations are designed to withstand the shrinking and swelling of the soil. It can be used as sites for roads and streets if suitable base material is used to compensate for the low strength of the soil and to reduce damage resulting from frost action in the soil.

This map unit is in capability class I.

36B—Tama silt loam, 2 to 4 percent slopes. This is a gently sloping, well drained soil on ridges, knolls, and side slopes along drainageways on uplands. Individual areas of this soil are long and narrow or irregular in shape; a few are circular. They range from 5 to 125 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 48 inches thick. The upper part is dark brown and dark yellowish brown silty clay loam; the middle part is yellowish brown, mottled silty clay loam, and the lower part is yellowish brown, mottled silt loam. The underlying material to a depth of 68 inches is light brownish gray and yellowish brown, calcareous silt loam. In places, plowing has mixed the upper part of the subsoil into the surface layer, and the result is a surface layer of dark brown silt loam. In other places, the subsoil is thinner than is typical, and calcareous silt loam is at a depth of 20 inches. In a few areas, this soil has slope of more than 4 percent. In other areas, there is fine sand at a depth of 40 inches.

Included with this soil in mapping are small areas of somewhat poorly drained, nearly level Ipava soils. These included soils make up about 5 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content is moderate, and natural fertility is high. The subsoil is neutral to slightly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, small grains, pasture, and hay. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, and small grains. If it is cultivated, there is a slight hazard of water erosion and soil blowing. Conservation tillage, terraces, contour farming, and the use of crop residue help to reduce soil blowing and water erosion.

This soil is suited to most types of onsite sewage disposal systems. Slope and seepage are moderate limitations for sewage lagoons. Seepage can be reduced if the bottom of the lagoons is sealed.

This soil is suited to use as sites for small buildings if the footings and foundations are designed to withstand the shrinking and swelling of the soil. It can be used as sites for roads and streets if proper base material is used to compensate for the low strength of the soil and to reduce damage resulting from frost action in the soil.

Erosion is a hazard in areas of new construction. Adding organic material to the surface and establishing a vegetative cover as soon as possible help to reduce surface runoff and control erosion.

This map unit is in capability subclass IIe.

36C2—Tama silt loam, 4 to 7 percent slopes, eroded. This is a moderately sloping, well drained soil on side slopes along drainageways, on convex ridges between drainageways, and on knolls on uplands. Individual areas are long and narrow; a few are circular. They range from 4 to 100 acres in size.

Typically, the surface layer is mixed with the upper part of the subsoil. It is very dark grayish brown and very dark brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. It is dark yellowish brown and yellowish brown silty clay loam in the upper part and yellowish brown silt loam in the lower part. The underlying material to a depth of 60 inches is yellowish brown and light brownish gray, calcareous silt loam. In places, the slope is less than 4 percent. In other places, where the soil is severely eroded, the upper part of the subsoil has been mixed by plowing with the surface layer, and the surface layer is dark yellowish brown silty clay loam. In a few areas, the surface layer is thicker than is typical. Also, in a few areas, the subsoil is thinner than is typical, and calcareous silt loam is at a depth of 10 inches. In places, there is glacial till in the lower part of the subsoil.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is medium. The available water capacity is very high. The organic matter content is moderate, and natural fertility is high. The subsoil is neutral and slightly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few areas, it is in pasture and hay. This soil has good potential for cultivated crops, small grains, pasture, and hay. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, and small grains. If this soil is used for cultivated crops, there is a hazard of water erosion. Conservation tillage, terraces, contour farming, conservation cropping systems, and crop residue help to reduce soil loss. Returning crop residue to the surface helps to increase infiltration and reduce surface runoff.

This soil is well suited to grasses and legumes, especially alfalfa, for pasture and hay. A good cover of these plants is effective in controlling erosion. If the soil is properly fertilized, seedlings are easily established, and the plants grow well. Proper stocking rates and pasture rotation help to keep pasture plants in good condition.

This soil is suited to onsite sewage disposal systems. However, slope is a severe limitation for sewage lagoons.

This soil is suited to use as sites for small buildings if the footings and foundations are designed to withstand the shrinking and swelling. It can be used as sites for roads and streets if proper base material is used to strengthen the roadbed and to reduce the damage resulting from frost action in the soil.

Erosion is a hazard in areas of new construction. Surface runoff and water erosion can be reduced if organic material is applied to the surface of the soil and if a vegetative cover is established as soon as possible.

This map unit is in capability subclass IIIe.

36D2—Tama silt loam, 7 to 12 percent slopes, eroded. This is a strongly sloping, well drained soil on side slopes along drainageways and on convex ridges between drainageways on uplands. Individual areas of this soil are long and range from 4 to 75 acres in size.

Typically, the surface layer is mixed with the upper part of the subsoil, and it is very dark grayish brown and very dark brown silt loam about 8 inches thick. The subsoil is yellowish brown, and it is about 36 inches thick. The upper part is silty clay loam and silt loam. The lower part is silt loam. The underlying material to a depth of 60 inches is yellowish brown, calcareous silt loam. In places, the slope is more than 12 percent, and the soil is severely eroded. In some areas where this soil is severely eroded, plowing has mixed the upper part of the subsoil into the surface layer, and the surface layer is yellowish brown silty clay loam. In these areas also, the subsoil is thinner than is typical, and calcareous silt loam is at a depth of 20 inches. In other areas where the soil is severely eroded, the surface layer and the underlying material are calcareous silt loam. In places, glacial till is in the lower part of the subsoil. In places, the surface layer is thinner than is typical.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is medium. The available water capacity is very high. The organic matter content is moderate, and natural fertility is high. The subsoil is neutral and slightly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few areas, it is in pasture and hay. This soil has fair potential for cultivated crops and small grains and good potential for pasture and hay. It has fair potential for building site development and septic tank absorption fields.

If erosion is controlled, this soil is suited to corn, soybeans, and small grains. Conservation tillage, terraces, contour farming, conservation cropping systems, and crop residue help to reduce soil loss. Returning crop residue to the soil and adding other organic material help to reduce surface runoff and erosion.

This soil is well suited to grasses and legumes, especially alfalfa, for pasture and hay. A good cover of these plants is effective in controlling erosion. If the soil is properly fertilized, seedlings are easily established and plants grow well. Proper stocking rates and pasture rotation help to keep pasture plants in good condition.

This soil can be used for building site development if the slope is altered and if foundations are designed to withstand the shrinking and swelling of the soil. It can be used as sites for roads and streets; however, frost action and low strength are limitations. The use of suitable base material can strengthen the roadbed and help prevent damage by frost action. If this soil is used as septic tank absorption fields, the tile should be placed on the contour so that the effluent is evenly distributed.

In areas of new construction, water erosion is a severe hazard. Diversions can be used to control surface runoff. Adding organic material to the surface and establishing a vegetative cover as soon as possible can reduce surface runoff and erosion.

This map unit is in capability subclass IIIe.

43—Ipava silt loam. This is a nearly level, somewhat poorly drained soil on the upland flats. Individual areas of this soil are irregular in shape and range from 3 to 500 acres in size.

Typically, the surface soil is black silt loam 16 inches thick. The subsurface layer is very dark gray silty clay loam 5 inches thick. The subsoil is silty clay loam, and it is about 30 inches thick. The upper part is brown and mottled. The lower part is grayish brown and mottled and is mixed with yellowish brown in the lower 7 inches. The underlying material to a depth of 63 inches is yellowish brown and light brownish gray, calcareous silt loam. In some areas, this soil has slope of more than 3 percent. In other areas, the subsurface layer is dark grayish brown and about 3 inches thick. In a few areas, the subsoil is less clayey than is typical.

Included with this soil in mapping are small areas of poorly drained Sable and Virden soils and well drained Tama soils. The Sable and Virden soils are in shallow depressions. The Tama soils are in slightly raised areas. The included soils make up 2 to 10 percent of the map unit.

Water and air move through this soil at a moderately slow rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content and natural fertility are high. The subsoil ranges from slightly acid to mildly alkaline. A seasonal high water table is within 1 to 3 feet of the surface. The frost-action potential in this soil and the shrink-swell potential are high.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and generally poor potential for sanitary facilities.

This soil is well suited to corn, soybeans (fig. 8), and small grains. Conservation tillage and the use of crop residue help to reduce soil blowing, and in areas where the slope is more than 3 percent, these management practices can be used to reduce soil loss from water erosion. Drainage is needed for optimum yields. Tile drains function satisfactorily if suitable outlets are available.

This soil is poorly suited to use as septic tank absorption fields. Sewers and sewage treatment facilities are a good alternative. This soil is well suited to use as sites for sewage lagoons.

This soil is suited to use as sites for houses without basements and for small commercial buildings if footings

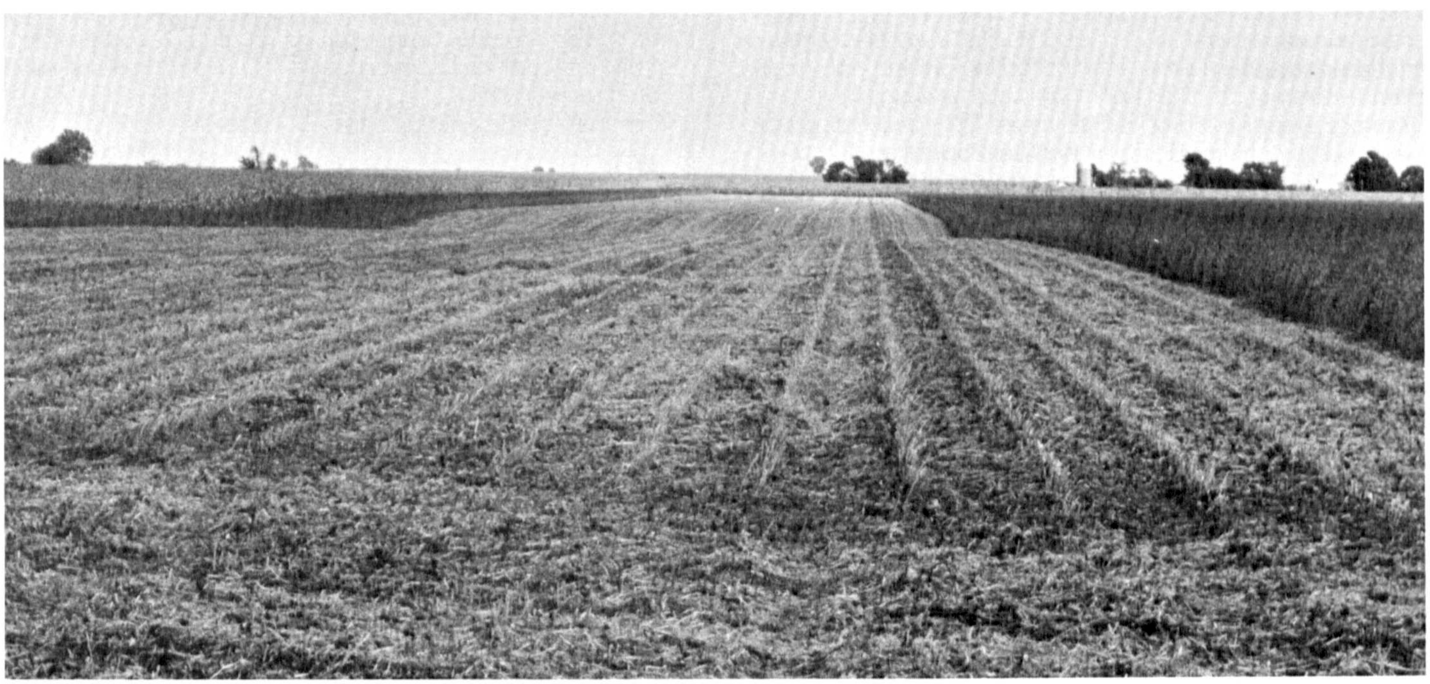


Figure 8.—This crop of soybeans is on Ipava silt loam. The crop residue will help to maintain the organic matter content and the tilth of the soil, and it will help to reduce surface runoff.

and foundations are designed to overcome the shrinking and swelling, wetness, and low strength. If this soil is used as sites for roads and streets, the use of suitable drainage systems and suitable base material can help to prevent damage resulting from shrinking and swelling, frost action, and low strength.

This map unit is in capability class I.

45—Denny silt loam. This is a nearly level, poorly drained soil in depressions on uplands. It is subject to occasional flooding for brief periods in spring. Individual areas of this soil are mainly circular in shape and range from 3 to 6 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsurface layer is gray silt loam about 8 inches thick. The subsoil is grayish brown and dark grayish brown, mottled silty clay loam about 40 inches thick. The underlying material to a depth of 65 inches is light brownish gray and yellowish brown silt loam. In some areas, the subsurface layer is thinner than is typical. In other areas of this soil, the subsurface layer has been mixed with the surface layer by plowing. In places, the surface layer is thicker than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils. These Ipava soils are in slightly higher lying areas surrounding the depressions.

Water and air move through this soil at a slow rate. Surface runoff in cultivated areas is slow to ponded. The available water capacity is very high. The organic matter content is moderate, and natural fertility is medium. The subsoil is medium acid to neutral. A seasonal high water table is within a depth of 2 feet. The surface layer crusts and hardens after rains. The potential is high for frost action in this soil and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops and fair potential for pasture and hay. It has poor potential for building site development and sanitary facilities.

This soil is suited to corn, soybeans, and small grains if adequate drainage and protection from flooding are provided. Tile drains do not function well because of the slow permeability of the soil. Tile inlets and shallow surface ditches help to remove excess water from this soil. Returning crop residue to the soil or regularly adding organic material help to maintain fertility, improve tilth, and reduce surface crusting.

This map unit is in capability subclass IIw.

50—Virden silty clay loam. This is a nearly level, poorly drained soil in depressions on upland flats. It is subject to occasional flooding for brief periods in spring. Individual areas of this soil are irregular in shape and range from 5 to 500 acres in size.

Typically, the surface soil is black silty clay loam about 15 inches thick. The subsoil is silty clay loam, and it is about 33 inches thick. The upper part is very dark gray, and the lower part is olive gray, light olive gray, and mottled. The underlying material to a depth of 61 inches is light olive gray, yellowish brown, and light olive brown, calcareous silt loam. In places, the surface soil is more than 24 inches thick. In some areas the subsoil is less clayey than is typical, and in other areas it is more clayey. In some areas the organic matter content in the surface soil is less than is typical. In a few areas the calcareous silt loam is at a depth of 25 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils and well drained Tama soils. Ipava soils are in slightly raised areas. Tama soils are on low ridges and knolls. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderately slow rate. Surface runoff in cultivated areas is slow or ponded. The available water capacity is very high. The organic matter content and natural fertility are high. The subsoil is slightly acid to mildly alkaline. The potential is high for frost action in this soil and for shrinking and swelling. During wet seasons, the water table is within 2 feet of the surface. The surface of this soil crusts after rains, and clods form if this soil is cultivated when it is wet.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops and fair potential for pasture and hay. It has poor potential for building site development and sanitary facilities.

If excess water is removed, this soil is suited to corn, soybeans, and small grains. Tile inlets and shallow surface ditches can be used to remove the excess water. Underground tile also helps to remove water, but drainage is limited by the moderately slow permeability. Returning crop residue to the soil or regularly adding other organic material helps improve soil tilth and reduce surface crusting.

This map unit is in capability subclass IIw.

67—Harpster silty clay loam. This is a nearly level, poorly drained soil in slight depressions on upland flats. It is subject to occasional flooding for brief periods in spring. Individual areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is black, calcareous silty clay loam about 9 inches thick. The subsurface layer is black and very dark gray, calcareous silty clay loam about 13 inches thick. The subsoil is calcareous silty clay loam about 22 inches thick. The upper part is dark gray, the middle part is olive gray and mottled, and the lower part is gray and mottled. The underlying material to a depth of 60 inches is gray, mottled, calcareous silt loam. In some areas, carbonates are at a depth of 30 inches. In other areas, the subsoil is silt loam.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils. These Ipava soils are in slightly raised areas adjacent to this Harpster soil. They make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow or ponded. The available water capacity is very high. The subsoil is mildly alkaline to moderately alkaline. The organic matter content and natural fertility are high. A seasonal high water table is within a depth of 2 feet. The surface layer crusts after rains, and clods form if this soil is cultivated when wet. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. It has good potential for cultivated crops and small grains. It has fair potential for grasses and legumes for hay and pasture. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. The growth of plant roots is restricted by excess water. Tile drains or shallow surface ditches help to remove excess water. Returning crop residue to the soil helps to improve tilth and reduce surface crusting.

This soil has fair suitability for grasses and legumes for pasture and hay. Artificial drainage is needed to remove the excess water. Grasses and legumes that are tolerant of wetness should be planted. Restricting grazing when the pasture is wet helps to keep the pasture plants and the soil in good condition.

This map unit is in capability subclass IIw.

68—Sable silty clay loam. This is a nearly level, poorly drained soil in depressions on upland flats. It is subject to occasional flooding for brief periods in spring. Individual areas of this soil are irregular in shape and range from 20 to 500 acres in size.

Typically, the surface soil is black silty clay loam about 19 inches thick. The subsoil is 23 inches thick. It is dark grayish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. The underlying material to a depth of 60 inches is light brownish gray, mottled, calcareous silt loam. In places, the subsoil is more clayey than is typical. In a few areas, the subsoil is thinner than is typical, and the calcareous silt loam is at a depth of 20 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils and well drained Tama soils. The Ipava soils are in slightly raised areas. The Tama soils are on low ridges and knolls. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow or ponded. The available water capacity is very high. The organic matter content and natural fertility are high. The subsoil is slightly acid to mildly alkaline. The potential is high for frost action and moderate for shrinking and swelling. During the wet season, the water table is within 2 feet of the surface. The surface of this soil crusts after rains, and clods form if this soil is cultivated when it is wet.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. Soil blowing is a slight hazard. Conservation tillage and returning crop residue to the soil help reduce crusting and the hazard of soil blowing.

If excess water is removed, this soil is suited to grasses and legumes for pasture and hay. Excess water restricts the growth of the roots of legumes. Tile drainage can be used to remove excess water. In a few areas, open ditches are more efficient. Proper stocking rates and the restriction of grazing when the pasture is wet help to keep the pasture plants and the soil in good condition.

This map unit is in capability subclass IIw.

73—Ross loam. This is a nearly level, well drained soil on flood plains and low terraces along major streams. This soil is subject to flooding for very brief periods in winter and spring. Individual areas of this soil are commonly long and narrow and range from 2 to 50 acres in size.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsurface layer is very dark gray and very dark grayish brown loam 26 inches thick. The underlying material to a depth of 60 inches is dark grayish brown and brown sandy loam. In a few areas, the surface layer is silt loam. In other areas of this soil, the surface layer and the subsurface layer are silt loam. In places, the underlying material is black silt loam or silty clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson, Radford, and Tice soils. These soils are in low-lying, poorly drained areas. The included soils make up 10 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is slow. The available water capacity is high. The organic matter content and natural fertility are high. Below the surface layer, the soil material is slightly acid to neutral. The potential is moderate for frost action.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. The only hazards for cultivated crops are soil blowing and slight flooding. This soil is flooded mainly after crops are harvested or before they are planted. Conservation tillage and the use of crop residue help to reduce the hazard of soil blowing.

This soil is well suited to grasses and legumes for pasture and hay. Overgrazing when the soil is wet can reduce forage production and cause surface compaction. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition.

This map unit is in capability class I.

74—Radford silt loam. This is a nearly level, somewhat poorly drained soil on the bottom land of streams and rivers. It is subject to flooding for brief periods in spring. Individual areas of this soil are long and narrow along small streams and irregular in shape along the rivers. They range from 5 to 500 acres in size.

Typically, the surface soil is very dark grayish brown silt loam about 15 inches thick. The underlying material is about 45 inches thick. The upper part is very dark gray silt loam 17 inches thick, and the lower part is black silty clay loam 28 inches thick. In places, the black silty clay loam layer is less than 20 inches thick or more than 40 inches. In a few areas, the surface soil is silty clay loam that is very dark grayish brown in the upper part and dark grayish brown in the lower part. In a few areas, black silt loam is at a depth below 41 inches.

Included with this soil in mapping are small areas of poorly drained Sawmill soils in lower lying areas. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content and natural fertility are high. Below the plow layer, the soil is acid to mildly alkaline. The water table is within 1 to 3 feet of the surface during the wet season. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few narrow areas, it is used for pasture. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. Tile drainage can be used to remove excess water from the soil. Diversions can be used to control surface water runoff in a few areas. Returning crop residue to the soil helps to maintain fertility and improve soil tilth.

This soil is suited to grasses and legumes for pasture and hay. The growth of roots, especially those of legumes, is restricted by excess water. Artificial drainage helps to remove excess water. Pasture plants and the soil can be kept in good condition by restricting grazing during wet periods and by preventing overgrazing.

This map unit is in capability subclass IIIw.

77—Huntsville silt loam. This is a nearly level, well drained soil on the bottom land along major streams. This soil is subject to occasional flooding for brief periods in spring. Individual areas of this soil are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is very dark gray and very dark grayish brown silt loam about 43 inches thick. The underlying material to a depth of 60 inches is dark brown silt loam. In some areas, the surface layer is thinner than is typical, and the underlying material is loam and sandy loam. In other areas, the texture is loam throughout.

Included with this soil in mapping are small areas of somewhat poorly drained Radford soils. Radford soils are in slightly lower lying areas adjacent to Huntsville soils. The included soils make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content is moderate and natural fertility is high. The surface layer is neutral to mildly alkaline. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, small grains, and grasses and legumes. The potential is poor for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, small grains, and grasses and legumes for pasture and hay. The only hazard is flooding, which occurs mainly before crops are planted in spring. If this soil is used for pasture, proper fertilization, proper stocking rates, rotation grazing and deferred grazing help to keep the pasture plants in good condition.

This map unit is in capability class I.

107—Sawmill silty clay loam. This is a nearly level, poorly drained soil on the bottom land of small streams and rivers. It is subject to occasional flooding for brief periods in spring. Individual areas are irregular in shape and range from 20 to 500 acres in size.

Typically, the surface layer is very dark gray silty clay loam about 10 inches thick. The subsurface layer is black and very dark gray silty clay loam about 22 inches thick. The subsoil is silty clay loam about 26 inches thick. It is dark gray in the upper part and grayish brown and mottled in the lower part. The underlying material to a depth of 60 inches is grayish brown, mottled silty clay loam. In places, the surface layer and subsurface layer are less than 24 inches thick or more than 36 inches thick. In a few areas, the surface layer is loam or clay loam. In a few areas, layers of sandy loam and loamy sand are below a depth of 40 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson, Radford, and Tice soils. These included soils are commonly in raised areas and are generally closer to stream channels than the Sawmill soil. The included soils make up 10 to 15 percent of this map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The subsoil is slightly acid to mildly alkaline. The organic matter content and natural fertility are high. The potential of this soil is high for frost action and moderate for shrinking and swelling. During the wet season, the water table is within 2 feet of the surface. The surface layer crusts after rains, and clods form if this soil is cultivated when it is wet.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. However, artificial drainage is needed. Tile can be used to remove the excess water. In many areas, the surface water is removed by open ditches. Returning crop residue to the soil and cultivating at the proper moisture content can help to reduce surface crusting and prevent the formation of clods.

This soil is suited to grasses and legumes for pasture and hay. Wetness is a hazard, and artificial drainage is needed. Excess water in this soil restricts the root growth of legumes. Proper stocking rates, pasture rotation, and restricted use during wet periods help keep the pasture plants and the soil in good condition.

This map unit is in capability subclass IIw.

112—Cowden silt loam. This is a nearly level, poorly drained soil on low-lying flats on uplands. Individual areas of this soil are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsurface layer is silt loam about 10 inches thick. It is dark gray in the upper 5 inches and grayish brown in the lower 5 inches. The subsoil is grayish brown, mottled silty clay loam about 32 inches thick. The underlying material to a depth of 68 inches is grayish brown or light brownish gray, mottled silt loam. In places, the surface layer is thicker than is typical. In other places, plowing has mixed the subsurface layer with the surface layer, and the surface layer is very dark grayish brown. In a few areas, the subsoil has more than 15 percent exchangeable sodium.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils. The Ipava soils are in slightly higher lying areas adjacent to this Cowden soil. The included soils make up 2 to 10 percent of the map unit.

Water and air move through this soil at a slow rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content is moderate, and natural fertility is medium. The subsoil is very strongly acid to neutral. A seasonal high water table is within 2 feet of the surface. The surface layer crusts and hardens after rains. The potential is high for frost action and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops and fair potential for hay and pasture. It has poor potential for building site development and septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains. Tile drains do not function well because of the slow permeability of the soil. Tile inlets and shallow surface ditches can be used to remove excess water. Returning crop residue to the soil or regularly adding organic material can help to maintain fertility, improve tilth, and reduce surface crusting.

This soil is suited to grasses and legumes for pasture and hay. Excess water in this soil restricts the growth of roots, especially the roots of legumes. If properly designed, surface ditches and tile inlets can be used to drain the excess water. Proper fertilization helps to establish seedlings and helps to keep the pasture plants in good condition. Restricting grazing when this soil is wet can reduce surface compaction and help to maintain pasture plants.

This map unit is in capability subclass IIw.

119D—Elco silt loam, 7 to 15 percent slopes. This is a strongly sloping, moderately well drained soil along drainageways. Individual areas of this soil are long and narrow and range from 3 to 150 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 8 inches thick. The subsoil is 58 inches or more thick. It is yellowish brown silty clay loam and silt loam in the upper 14 inches, grayish brown and yellowish brown silty clay loam in the middle 29 inches, and gray, mottled loam in the lower 15 inches. In places, plowing has mixed the upper part of the subsoil with the surface layer and the subsurface layer. As a result, the surface layer is brown silt loam. In other places, the subsoil is thinner than is typical. In some places, the subsoil is more sandy than is typical. In places, the seasonal water table is at a depth of more than 5 feet.

Water and air move through the surface layer and the upper part of the subsoil at a moderate rate and through the lower part of the subsoil at a moderately slow rate. Surface runoff is medium. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is slightly acid. A seasonal high water table is about 3 feet below the surface. The potential for frost action in this soil is high. It is moderate for shrinking and swelling.

In most areas, this soil is used as woodland or for pasture or hay. In a few areas, it is cultivated. This soil has fair potential for cultivated crops and good potential for pasture and hay and for woodland use. It has good potential for wildlife habitat, fair potential for recreation uses, fair potential for building site development, and poor potential for sanitary facilities.

This soil is suited to corn, soybeans, and small grains. If the soil is used for cultivated crops, erosion is a hazard. Conservation tillage, terraces, contour farming, conservation cropping systems, and crop residue help to reduce soil loss. Returning crop residue to the soil and adding other organic material help to increase infiltration and improve fertility.

The use of this soil for pasture and hay is effective in reducing erosion. Proper fertilization helps to establish new seedlings. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition.

This soil is well suited to use as woodland. Competing vegetation can be controlled by cutting, girdling, or the use of chemicals.

This soil is well suited to use as habitat for woodland wildlife. It is also well suited to use as habitat for openland wildlife if erosion is controlled and if the soil is properly fertilized.

This soil is suited to use as sites for small buildings. Buildings should be designed to offset the slope and the shrinking and swelling of the soil. Water erosion is a hazard in areas of new construction. The addition of organic material to the surface and the establishment of a vegetative cover help to reduce soil loss. If this soil is used for roads and streets, the use of suitable base material can help prevent damage resulting from frost action in the soil.

The moderately slow permeability of the lower part of the subsoil and the seasonal high water table limit this soil for use as septic tank absorption fields. Lowering the water table and increasing the area of the absorption field can help to overcome these limitations.

This map unit is in capability subclass IIIe.

119D3—Elco silty clay loam, 7 to 12 percent slopes, severely eroded. This is a strongly sloping, moderately well drained soil on side slopes along drainageways. Individual areas of this soil are long and narrow and range from 5 to 125 acres in size.

Typically, the surface layer is brown silty clay loam about 8 inches thick. The subsoil is more than 62 inches thick. It is yellowish brown silty clay loam in the upper part, grayish brown and yellowish brown silty clay loam and clay loam in the middle part, and gray, mottled loam in the lower part. In some places, the surface layer is dark brown, heavy clay loam and is underlain by a buried horizon of clay loam. In other places, the surface layer is brown silt loam about 8 inches thick. In some areas, the subsoil is thinner than is typical. In some places, the subsoil is more sandy than is typical.

Water and air move through the surface layer and the upper part of the subsoil at a moderate rate and through the lower part of the subsoil at a moderately slow rate. Runoff in cultivated areas is rapid. The available water capacity is high. The organic matter content is low, and natural fertility is medium. The subsoil is strongly acid to neutral. A seasonal water table is at a depth of about 3 feet. The potential is high for frost action in this soil and moderate for shrinking and swelling. The surface layer crusts after rains.

In most areas, this soil is cultivated. This soil has poor potential for cultivated crops and fair potential for hay and pasture. It has good potential for use as woodland. It has good potential for wildlife habitat, fair potential for recreation uses, fair potential for building site development, and poor potential for sanitary facilities.

This soil is poorly suited to corn, soybeans, and small grains. If the soil is used for cultivated crops, further erosion is a severe hazard. A good seedbed is difficult to prepare because the surface layer crusts and clods form if the soil is cultivated.

This soil is suited to pasture and hay. A good cover of pasture and hay plants on the soil helps to reduce erosion. Seedlings are difficult to establish because the surface crusts and clods form. Proper fertilization helps to establish seedlings and maintain pasture plants. Restricting grazing when the soil is wet helps to reduce compaction and improve tilth, thereby reducing soil loss.

This soil is well suited to use as woodland. Erosion is a hazard before trees are established. Soil loss can be reduced if organic material is applied to the surface. Machinery for planting tree seedlings should be used only when the surface layer is dry. Competing vegetation can be controlled by spraying or cutting.

This map unit is in capability subclass IVe.

119E3—Elco silty clay loam, 12 to 18 percent slopes, severely eroded. This is a moderately steep, moderately well drained soil along drainageways. Individual areas of this soil are long and narrow and range from 5 to 125 acres in size.

Typically, the surface layer is brown silty clay loam about 7 inches thick. The subsoil is more than 63 inches thick. It is yellowish brown silty clay loam in the upper part, grayish brown and yellowish brown silty clay loam and clay loam in the middle part, and gray loam in the lower part. In places, the surface layer is brown, heavy clay loam and is underlain by an older buried horizon of grayish brown and gray, heavy clay loam. In other places, the surface layer is very dark grayish brown silt loam about 4 inches thick. In a few areas, the subsoil is thinner than is typical, and the underlying material is grayish brown loam. In some places, the subsoil is more sandy than is typical. In places the seasonal water table is at a depth of more than 5 feet.

Included with this soil in mapping are small areas of moderately deep Gosport soils on side slopes below this soil. The included soils make up 10 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate in the surface layer and upper part of the subsoil and at a moderately slow rate in the lower part of the subsoil. Surface runoff is rapid. The available water capacity is high. The organic matter content is low, and natural fertility is medium. The subsoil is medium acid to neutral. A seasonal water table is at a depth of about 3 feet. The potential of this soil is high for frost action and moderate for shrinking and swelling. The surface layer crusts after rains.

In most areas, this soil is used for pasture or hay. In a few areas it is used for cultivated crops or as woodland. This soil has poor potential for cultivated crops, hay, and pasture. It has good potential for use as woodland. It has good to fair potential for most kinds of wildlife habitat, fair potential for most recreation uses, and poor potential for building site development and sanitary facilities.

This soil is not suited to corn, soybeans, and small grains. Excessive slope and water erosion are severe limitations. Conservation tillage and crop residue left on the surface cannot overcome these limitations.

This soil is poorly suited to pasture and hay because of excessive slope and severe erosion. A good cover of pasture plants helps to reduce soil loss. Seedlings of pasture and hay plants are difficult to establish because the surface crusts and clods form. Erosion is a severe hazard to seedlings. Proper fertilization helps seedlings to grow, and proper stocking rates and pasture rotation help to maintain pasture plants. Restricting grazing while the soil is wet helps to reduce runoff and surface compaction.

This soil is suited to woodland use, but erosion is a hazard to new plantings. The site should be well prepared so tree seedlings can survive. Competing vegetation can be controlled by spraying or cutting. Care should be taken on the slopes in planting or harvesting by machine. Machinery should be used only when the surface layer is dry.

This map unit is in capability subclass VIe.

131C—Alvin loamy sand, 4 to 7 percent slopes. This is a moderately sloping, well drained soil along drainageways and on knolls and long, narrow ridgetops on uplands. Individual areas of this soil are mainly narrow and long and range from 3 to 30 acres in size.

Typically, the surface layer is dark brown loamy sand about 9 inches thick. The subsurface layer is dark brown sandy loam about 4 inches thick. The subsoil is about 28 inches thick, and it is strong brown and brown. The upper part is sandy loam, the middle part is light sandy clay loam, and the lower part is sandy loam and loamy sand. The underlying material to a depth of 60 inches is strong brown loamy sand and sand. In some places, the surface layer is very dark grayish brown fine sandy loam. In a few areas the slopes are less than 4 percent.

Included with this soil in mapping are small areas of well drained Middletown soils and moderately well drained Thebes soils. These soils are more clayey in the subsoil than is typical. These included soils are commonly between ridges or on the lower side slopes of ridges. The included soils make up 10 to 20 percent of the map unit.

Water and air move through the subsoil at a moderate rate and through the underlying material at a moderately rapid rate. Surface runoff is slow. The available water capacity is moderate. The subsoil is medium acid to strongly acid. The organic matter content is low, and natural fertility is medium. This soil can be tilled soon after rainy periods because the surface layer is friable over a wide range in moisture content. Levels of nitrogen and potassium are low because of the low content of clay and organic matter. The potential is moderate for frost action.

In most areas, this soil is used for cultivated crops or pasture or as woodland. This soil has fair potential for corn, soybeans, small grains, pasture, and hay. It has good potential for use as woodland. It has good potential for building site development and septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains. Erosion, soil blowing, droughtiness, and maintenance of fertility are major management concerns. Returning crop residue to the soil and adding other organic material help to reduce soil blowing, improve fertility, and increase the available water capacity. Terraces, conservation tillage, conservation cropping systems, contour farming, and crop residue help to reduce soil loss.

This soil is suited to grasses and legumes for hay and pasture. A good cover of these plants helps to reduce water erosion and soil blowing. Proper fertilization, proper stocking rates, and pasture rotation can help to maintain a good crop cover. Deferment of grazing during dry seasons helps to maintain pasture plants.

This soil is well suited to use as woodland. Plant competition is the main hazard to the survival and growth of tree seeds and seedlings. Competing vegetation can be controlled by adequately preparing the planting sites and, after planting, by cutting and using chemicals. There are no significant limitations to the use of equipment in planting or harvesting trees.

Septic tank absorption fields can function properly in this soil, but there is a hazard of contaminating nearby ground water. Seepage from sewage lagoons and sanitary landfills is a severe problem, but it can be reduced by sealing the bottom of lagoons and landfills. Where possible, public sewage disposal systems should be used. This soil is suited to building site development. It is limited for use as sites for roads and streets because of the hazard of frost action.

This map unit is in capability subclass IIIe.

131D—Alvin loamy sand, 7 to 12 percent slopes. This is a strongly sloping, well drained soil on uplands, mainly along drainageways. A few areas of this soil are on widely scattered knolls and ridges. Most individual areas are long. A few are irregular in shape. Individual areas of this soil range from 4 to 35 acres in size.

Typically, the surface layer is dark brown loamy sand about 10 inches thick. The subsoil is about 20 inches thick, and it is strong brown and brown. The upper part is sandy loam, the middle part is light sandy clay loam, and the lower part is sandy loam and loamy sand. The underlying material to a depth of 60 inches is strong brown loamy sand and sand. In places, this soil is eroded, and the surface layer is brown or yellowish brown sandy loam 3 to 6 inches thick. In other places, the subsoil is fine sandy loam and loamy sand.

Included with this soil in mapping are well drained Hickory and Middletown soils and moderately well drained Thebes soils. These soils are more clayey in the subsoil than is typical. The Hickory soils are on side slopes below this Alvin soil. Middletown and Thebes soils are above the Alvin soil, commonly near the head of drainageways. The included soils make up about 10 percent of this map unit.

Water and air move through the subsoil at a moderate rate and through the underlying material at a moderately rapid rate. Surface runoff is slow. The available water capacity is moderate. The organic matter content is low, and natural fertility is medium. The subsoil is medium acid to strongly acid. This soil can be tilled soon after rainy periods because the surface layer is friable over a wide range in moisture content. Levels of nitrogen and potassium are low in this soil because of the low content of clay and organic matter. The potential is moderate for frost action.

This soil is used mainly for pasture, hay, and woodland and to a lesser extent for cultivated crops. It has poor potential for corn, soybeans, and small grains. It has fair potential for pasture and hay and good potential for woodland use. It has fair potential for building site development and septic tank absorption fields.

This soil is poorly suited to corn, soybeans, and small grains because it is droughty and because erosion is a hazard. The addition of crop residue and other organic material to the soil helps to reduce soil loss, improve fertility, and increase the available water capacity. Soil loss from water erosion and soil blowing can be reduced by conservation tillage and conservation cropping systems. Water erosion can be further reduced by terracing and contour farming.

This soil is suited to grasses and legumes for hay and pasture. Maintaining a vegetative cover is very effective in controlling erosion. Forage crops grow well if the soil is properly fertilized. Proper stocking rates and pasture rotation help to keep the pasture in good condition. Deferment of grazing during dry seasons helps to maintain pasture plants.

Trees grow well on this soil, and woodland is common. Tree seeds and seedlings survive and grow well if competing vegetation is controlled by properly preparing sites before planting and by cutting and by using chemicals after planting. There are no limitations to the use of equipment in planting and harvesting trees.

Effluent from septic tank absorption fields can contaminate nearby ground water. Excessive seepage from sewage lagoons and sanitary landfills can be reduced by properly sealing the bottom of the lagoons and landfills. The slope of the soil is a moderate limitation for excavations, buildings, roads, and streets, but proper design can help to overcome this limitation. Frost action is a hazard to roads and streets built on this soil. Raising the roadbed by grading can help to reduce this hazard.

This map unit is in capability subclass IIIe.

131E2—Alvin loamy sand, 12 to 20 percent slopes, eroded. This is a moderately steep, well drained soil along drainageways on uplands. Individual areas of this soil are long or irregular in shape and range from 5 to 45 acres in size.

Typically, the surface layer is brown loamy sand about 8 inches thick. The subsoil is about 18 inches thick, and it is brown. It is sandy loam in the upper part and loamy sand in the lower part. The underlying material to a depth of 60 inches is brown loamy sand and sand. In some places, the subsoil is sandy clay loam. In other places, the surface layer is 8 to 12 inches thick. In some areas, the surface layer is fine sandy loam or sandy loam 3 to 6 inches thick.

Included with this soil in mapping are moderately deep Gosport soils, well drained Hickory soils, and moderately well drained Thebes soils. The Gosport and Hickory soils are on side slopes below this Alvin soil. These included soils are more clayey in the subsoil than is typical. Thebes soils are on side slopes above this Alvin soil and at the head of drainageways.

Water and air move through the subsoil at a moderate rate and through the underlying material at a moderately rapid rate. Surface runoff is medium. The available water capacity is low. The organic matter content is low, and natural fertility is medium. The subsoil is slightly acid to medium acid. The supply of nitrogen and potassium is low because the content of clay and organic matter is low.

This soil is used mainly for pasture and as woodland. In a few areas it is used for hay and cultivated crops. This soil has poor potential for corn, soybeans, and small grains. It has fair potential for pasture and hay and good potential for use as woodland. It has poor potential for building site development and sanitary facilities.

This soil is poorly suited to corn, soybeans, and small grains because of excessive slope and the erosion hazard. Droughtiness is another limitation.

This soil is suited to grasses and legumes for hay and pasture. If grazing is deferred during dry seasons and if the soil is properly fertilized, a good vegetative cover can be maintained. This vegetative cover can reduce soil loss. Proper stocking rates and pasture rotation can help to maintain pasture plants.

This soil is well suited to trees, especially pine. Tree seedlings survive and grow well if competing vegetation is controlled by proper site preparation before planting and by cutting, girdling, or the use of chemicals after planting. In new plantings, erosion is a hazard, but soil loss can be reduced by growing cover crops when trees are small. The addition of organic material can further reduce soil loss. Because of the slope, mechanical planters or harvesters should be operated carefully.

Grains, grasses, and legumes on this soil can provide habitat for openland wildlife. Areas now stocked with trees and shrubs provide habitat for woodland wildlife.

This map unit is in capability subclass IVe.

134A—Camden silt loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on terraces along streams and rivers. The areas are irregular in shape and range from 3 to 50 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is dark brown or brown silt loam about 6 inches thick. The subsoil is about 40 inches thick. It is dark brown or dark yellowish brown silty clay loam in the upper part and dark yellowish brown clay loam in the lower part. The underlying material to a depth of 60 inches is dark yellowish brown loam. In some places, the surface layer is dark and is 5 to 8 inches thick. In a few small areas, it is loam or sandy loam. In places, loam and sandy loam are within a depth of 10 to 20 inches. In other places, loam and sandy loam are at a depth of more than 60 inches. In places, flooding may occur for brief periods.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall soils and poorly drained Sexton soils. These soils are in shallow depressions. They make up about 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is slow. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is slightly acid to medium acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture and for use as woodland. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, small grains, and hay and pasture. Soil blowing is a slight hazard if the soil is used for cultivated crops. Crop residue use and conservation tillage help to reduce soil blowing and help to maintain the organic matter content.

If the soil is used for pasture or hay, overgrazing should be avoided. Proper fertilization and good pasture and hay management help to keep the vegetation and the soil in good condition.

This soil is well suited to many tree species. There are no limitations to planting and harvesting.

This soil is generally suited to use as septic tank absorption fields. If sewage lagoons and trench sanitary landfills are placed in areas where the underlying material is sandy, seepage is a severe hazard.

If this soil is used as sites for buildings, the foundations need to be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, the use of suitable base material can help to prevent damage resulting from frost action in the soil and shrinking and swelling of the soil.

This map unit is in capability class I.

134B—Camden silt loam, 2 to 4 percent slopes. This is a gently sloping, well drained soil on convex ridges, on knolls, along drainageways, and on terraces of major streams. The areas are mainly long and narrow, but some areas are circular or irregular in shape. They range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is dark brown silt loam about 6 inches thick. The subsoil is about 40 inches thick, and it is dark yellowish brown. It is silty clay loam in the upper part and clay loam in the lower part. The underlying material to a depth of 60 inches is dark yellowish brown loam and sandy loam. In some places, the underlying loamy material is within 10 to 20 inches of the surface. In other places, the silty clay loam part of the subsoil is thicker than is typical. In some small areas the surface layer is loamy sand or sandy loam. Some small areas of this soil are subject to rare flooding for brief periods.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall soils and poorly drained Sexton soils. These soils are in shallow depressions and make up about 5 to 10 percent of the map unit.

Water and air move through the soil at a moderate rate. Surface runoff is slow. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is slightly acid to medium acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture and for woodland use. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, small grains, and hay and pasture. Water erosion and soil blowing are slight hazards where cultivated crops are grown. Soil loss can be reduced by conservation tillage, contour farming, and terracing. Returning crop residue to the soil or adding other organic material helps to maintain the content of organic matter, improve fertility, and reduce soil loss.

The use of this soil for pasture or hay can control erosion. Overgrazing should be avoided. Proper fertilization helps to keep the pasture plants in good condition.

This soil is well suited to use as woodland. There are many suitable species to plant. Tree seeds and seedlings grow well if competing vegetation is controlled by properly preparing the site before planting and by spraying and cultivating after planting.

This soil is generally suited to use as septic tank absorption fields. It is limited, however, for use as sites for sewage lagoons and trench sanitary landfills; the sandy underlying material permits excessive seepage from these types of sanitary facilities.

If this soil is used as sites for buildings, foundations need to be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, the use of suitable base material can help to reduce the damage resulting from frost action and shrinking and swelling. Raising the roadbed by grading can further reduce the damage from frost action.

This map unit is in capability subclass IIe.

134C2—Camden silt loam, 4 to 7 percent slopes, eroded. This is a moderately sloping, well drained soil on convex ridges along drainageways and on terraces of major streams. A few areas of this soil are along drainageways on uplands. Individual areas of this soil are mainly long and narrow, but some are irregular in shape. They range from 3 to 35 acres in size.

Typically, the surface layer is mixed with the upper part of the subsoil. It is dark grayish brown silt loam about 8 inches thick. The subsoil is dark yellowish brown, and it is about 35 inches thick. It is silty clay loam in the upper part and clay loam in the lower part. The underlying material to a depth of 60 inches is dark yellowish brown loam and sandy loam. In some places where the upper part of the subsoil has been mixed with the surface layer by plowing, the surface layer is dark grayish brown light silty clay loam. In some small areas, the surface layer is loamy sand or sandy loam. In places, the silty clay loam part of the subsoil is thicker than is typical. In some small areas, this soil is subject to rare flooding for brief periods.

Included with this soil in mapping are small areas of well drained Alvin soils that are less clayey and more sandy throughout than the Camden soil. They are on the same landscape as this Camden soil. The included soils make up about 10 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is medium. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is slightly acid to strongly acid.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, pasture, and woodland use. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, small grains, and hay and pasture. If it is used for cultivated crops, water erosion and soil blowing are hazards. Terraces, contour farming, conservation tillage, and conservation cropping systems help to reduce soil loss. Returning crop residue to the soil and adding other organic material help to maintain the content of organic matter, improve fertility, and reduce soil blowing.

The use of this soil for pasture or hay is effective in controlling erosion. Overgrazing should be avoided. Proper fertilization helps to keep the pasture plants and the soil in good condition.

This soil is well suited to use as woodland. There are many suitable species to plant. There are few limitations to planting or harvesting trees. Erosion control practices should be used when planting and harvesting.

This soil is suited to use as septic tank absorption fields. However, seepage from absorption fields can contaminate nearby ground water. Excessive seepage is a hazard if this soil is used as sites for sewage lagoons and sanitary landfills. The hazard of seepage from sewage lagoons can be reduced by sealing the bottom of the lagoons.

If this soil is used as sites for buildings, foundations need to be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, the use of proper base material can help to offset the shrinking and swelling. In areas of new construction, erosion is a hazard. Adding organic material to the surface immediately after the soil is disturbed and establishing a vegetative cover as soon as possible help to reduce this hazard.

This map unit is in capability subclass IIe.

134D3—Camden silty clay loam, 7 to 12 percent slopes, severely eroded. This is a strongly sloping, well drained soil on short, smooth side slopes along stream terraces and along drainageways on uplands. Individual areas of this soil are long and narrow and range in size from 5 to 60 acres.

Typically, the surface layer is dark brown light silty clay loam about 7 inches thick. The subsoil is dark yellowish brown, and it is about 35 inches thick. The upper part is silty clay loam, and the lower part is clay loam. The underlying material to a depth of 60 inches is brown and dark yellowish brown sandy loam and loam. In places, the subsoil is thinner than is typical, and the underlying material is within a depth of 10 to 20 inches. In some places, the soil material below a depth of 40 inches consists of layers of gravel and gravelly sandy loam over gray silty clay loam. In a few areas, the slopes range to 18 percent. In places, the silty clay loam part of the subsoil is thicker than is typical.

Included with this soil in mapping are small areas of moderately well drained Thebes soils. These included soils are on side slopes above the Camden soil, and they make up about 5 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The organic matter content is low, and natural fertility is medium. The subsoil is slightly acid to strongly acid. The surface layer crusts after heavy rains, and clods form if the soil is cultivated when wet.

In most areas, this soil is cultivated. In a few areas, it is used for hay or pasture or as poorly stocked woodland. This soil has good potential for hay and pasture and for use as woodland. It has poor potential for cultivated row crops and fair potential for building site development and septic tank absorption fields.

This soil is poorly suited to corn, soybeans, and small grains. If cultivated crops are grown, there is a severe hazard of further erosion. Terraces, contour farming, conservation tillage, and crop residue can help to reduce soil loss. Returning crop residue and adding other organic material to the soil can help to increase water infiltration, reduce surface crusting, improve fertility, and maintain the content of organic matter.

Grasses and legumes for hay and pasture grow well if the soil is adequately protected from erosion and is properly fertilized. Grazing when the soil is wet causes surface compaction and poor tilth and increases runoff. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition. Seedlings should be allowed to become well established before the pasture is grazed.

This soil is well suited to use as woodland. Tree seedlings should be planted on the contour. A dry surface is required for planting. In new plantings, soil loss can be reduced if organic material is applied to the surface.

Septic tank absorption fields will function properly in this soil if the tiles are placed on the contour to offset the slope. Seepage from absorption fields can contaminate nearby ground water. Seepage is a severe problem if this soil is used as sites for sanitary landfills and sewage lagoons. To avoid this problem, public sewage treatment facilities should be used.

This soil is suited to use as sites for small buildings that are designed to offset the slope and that have foundations designed to withstand the shrinking and swelling of the soil. Good roads and streets can be built on this soil if they are properly designed and if suitable base material is used. Where possible, roads and streets should be placed on the contour.

In areas disturbed by construction, erosion is a hazard. Soil loss can be reduced if organic material is applied to the surface and if vegetative cover is established as soon as possible.

This map unit is in capability subclass IVe.

138—Shiloh silty clay loam. This is a nearly level, very poorly drained soil on low terraces along rivers, in shallow depressions, and on flood plains of drainageways on uplands. Individual areas of this soil are commonly irregular in shape. They are round in depressions, and long and narrow in the drainageways. They are subject to frequent flooding for brief periods in spring. Individual areas of this soil range in size from 2 to 150 acres.

Typically, the surface soil is black silty clay loam 18 inches thick. The subsoil is about 38 inches thick. It is black silty clay loam in the upper part, very dark gray silty clay in the middle part, and olive gray and gray, mottled silty clay loam in the lower part. The underlying material to a depth of 60 inches is gray, mottled silty clay loam. In some areas, the surface soil is silt loam. In a few areas, an olive gray layer is within a depth of 24 inches, and in some areas, the subsoil is less clayey than is typical.

Water and air move through this soil at a slow or moderately slow rate. Surface runoff is very slow. The available water capacity is high. The organic matter content and natural fertility are high. The subsoil is slightly acid to mildly alkaline. The potential is high for frost action and for shrinking and swelling. During wet seasons, the water table is within 2 feet of the surface. The surface layer crusts after rains, and clods form if this soil is cultivated when wet.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops and fair potential for hay and pasture. It has poor potential for building site development and sanitary facilities.

If excess water is removed, this soil is suited to corn, soybeans, and small grains. Tile inlets or shallow surface ditches can be used to drain this soil. Returning crop residue to the soil and tilling the soil at the proper moisture content can help to reduce surface crusting and clodding.

This soil is suited to grasses and legumes for pasture and hay. Artificial drainage is needed to remove excess water. Only plants that have a high tolerance for wetness should be planted. Using proper stocking rates and restricting grazing during wet periods can help to keep the pasture plants and the soil in good condition.

This map unit is in capability subclass IIw.

198—Elburn silt loam. This is a nearly level and gently sloping, somewhat poorly drained soil on terraces along major streams. Individual areas of this soil are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsurface layer is black silt loam about 6 inches thick. The subsoil is brown and grayish brown, mottled silty clay loam in the upper 38 inches and yellowish brown, grayish brown, and brownish yellow, stratified loam, sandy loam, and clay loam in the lower 7 inches. In some areas, the loamy material is within a depth of 20 to 30 inches. In some small areas, this soil is subject to rare flooding for brief periods. In places, the surface layer is thinner than is typical.

Included with this soil in mapping are small areas of well drained Camden and Plano soils and poorly drained Sexton soils. The Camden and Plano soils are gently sloping and are on terraces. Sexton soils are in slight depressions on terraces. The included soils make up 10 to 15 percent of this map unit.

Water and air move through this soil at a moderate rate, and surface runoff is slow. The available water capacity is high. The organic matter content is high, and natural fertility is high. The subsoil is slightly acid to medium acid. A seasonal high water table is commonly within a depth of 1 foot. The potential is high for frost action.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. If it is used for cultivated crops, drainage is needed for optimum yields. Properly placed tile can help to remove the excess water. Returning crop residue to the soil can help to improve tilth and reduce surface crusting.

This soil is suited to grasses and legumes for pasture and hay. Proper fertilization and pasture rotation can help to maintain pasture plants. Restricting grazing during wet periods helps to keep the vegetation and the soil in good condition.

This map unit is in capability class I.

199A—Plano silt loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on stream terraces. Individual areas of this soil are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface soil is very dark grayish brown silt loam about 15 inches thick. The subsoil is silty clay loam about 40 inches thick. It is brown and dark yellowish brown in the upper part and yellowish brown in the lower part. The underlying material to a depth of 60 inches is dark yellowish brown and yellowish brown loam and loamy sand. In a few areas, the subsoil is thinner than is typical, and the underlying loamy material is at a depth of 30 inches. In other areas, the subsoil is mottled with gray. In places, the surface soil is thinner than is typical.

Included with this soil in mapping are somewhat poorly drained Kendall soils and poorly drained Sexton soils. These soils are in slight depressions. They make up 5 to 10 percent of the map unit.

Water and air move through this soil at a moderate rate. The available water capacity is high. Surface runoff is slow. The organic matter content is moderate, and natural fertility is high. The subsoil is medium acid to strongly acid. The potential is high for frost action and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains. Soil blowing is a slight hazard. Crop residue use and conservation tillage can help to reduce soil blowing.

This soil is well suited to grasses and legumes for pasture and hay. Seedlings are easy to establish. Proper fertilization, proper stocking rates, and pasture rotation can help to keep the pasture plants and the soil in good condition.

This soil is suited to use as septic tank absorption fields. If it is used as sites for houses, the footings of foundations should be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads, the use of suitable base material can help strengthen the roadbed and reduce the damage resulting from frost action in the soil.

This map unit is in capability class I.

199B—Plano silt loam, 2 to 7 percent slopes. This is a gently sloping, well drained soil on side slopes along drainageways and on ridges and knolls on terraces along major streams and rivers. Individual areas of this soil are mainly long and range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 12 inches thick. The subsoil is silty clay loam about 38 inches thick. It is dark yellowish brown in the upper part and yellowish brown in the lower part. The underlying material to a depth of 60 inches is brown and yellowish brown loam and loamy sand. In places, the subsoil is thinner than is typical, and the underlying sandy and loamy material is at a depth of 15 inches. In a few areas, the slopes range to 12 percent. In some areas, this soil is eroded. In these areas, the upper part of the subsoil has been mixed with the surface layer by plowing, and the surface layer is about 8 inches thick. In places, the underlying material is calcareous silt loam and is at a depth of 40 inches or more. In places, the surface layer is thinner than is typical.

Water and air move through the soil at a moderate rate. Surface runoff is slow to medium. The available water capacity is high. The organic matter content is moderate, and natural fertility is high. The subsoil is medium acid and strongly acid. The potential is high for frost action and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains. Water erosion and soil blowing are slight hazards. Terraces, contour farming, conservation cropping systems, conservation tillage, and crop residue use can help to reduce water erosion and soil blowing.

This soil is well suited to grasses and legumes for pasture and hay. This vegetation can effectively control soil erosion. Seedlings are easily established. Proper fertilization, proper stocking rates, and pasture rotation can help to keep the pasture plants and the soil in good condition.

This soil is suited to use as septic tank absorption fields. If it is used as sites for houses, the footings of foundations should be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads, the use of suitable base material can help strengthen the roadbed and reduce the damage resulting from frost action in the soil.

This map unit is in capability subclass IIe.

208—Sexton silt loam. This is a nearly level, poorly drained soil on low terraces along streams and rivers. It is subject to rare flooding. Individual areas of this soil are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is dark gray silt loam about 10 inches thick. The subsurface layer is grayish brown silt loam about 6 inches thick. The subsoil is silty clay loam about 38 inches thick. It is grayish brown and mottled in the upper part and gray and mottled in the lower part. The underlying material to a depth of 60 inches is gray and yellowish brown silt loam and loam. In some areas, the surface layer is very dark grayish brown silt loam about 8 inches thick. In a few areas, the surface layer is sandy loam or loamy sand. In a few areas, the subsoil is thinner than is typical.

Included with this soil in mapping are small areas of well drained Camden soils and somewhat poorly drained Kendall soils. The Camden soils are on ridges and knolls, and the Kendall soils are in raised areas. The included soils make up about 15 to 20 percent of the map unit.

Water and air move through this soil at a slow rate. Surface runoff in cultivated areas is slow. The available water capacity is very high. The organic matter content is moderate, and natural fertility is medium. The subsoil is slightly acid or strongly acid. The potential is high for frost action and for shrinking and swelling. During wet seasons, the water table is within 2 feet of the surface.

In most areas, this soil is cultivated. This soil has fair potential for cultivated crops, pasture, and hay. It has good potential for woodland use. It has poor potential for building site development and sanitary facilities.

This soil is suited to corn, soybeans, and small grains. Artificial drainage is necessary for optimum yields. Shallow, open ditches can be used to remove excess water. Because of the slow permeability of this soil, tile drains are not effective.

This soil is suited to grasses and legumes for pasture and hay. The growth of roots of legumes is restricted by excess water. Shallow surface ditches can help to remove this excess water. Proper stocking rates, pasture rotation, and restricted grazing during wet periods can help to keep the pasture plants and the soil in good condition.

This soil is well suited to trees that have a tolerance for wetness. Plant competition is a severe hazard. The undesirable vegetation can be controlled by spraying and cutting. Machines for harvesting should be used only when the surface of the soil is dry.

This map unit is in capability subclass IIIw.

212D3—Thebes silty clay loam, 7 to 15 percent slopes, severely eroded. This is a strongly sloping, moderately well drained soil along drainageways and on ridges on uplands. Individual areas of this soil are long and narrow and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown silty clay loam about 8 inches thick. The subsoil is about 29 inches thick. It is dark yellowish brown and yellowish brown silty clay loam in the upper part and yellowish brown, mottled loam in the lower part. The underlying material to a depth of 60 inches is dark yellowish brown, yellowish brown, and light brownish gray loamy sand and silt loam. In a few areas, the surface layer is silt loam or loam. In places, there is a brown subsurface layer about 4 inches thick. In a few areas, the subsoil is thicker than is typical.

Included with this soil in mapping are small areas of well drained Alvin and Fayette soils. The Alvin soils are less clayey and more sandy throughout than this Thebes soil, and they are commonly on steeper side slopes below this soil. The Fayette soils are less sandy in the subsoil and in the underlying material and are commonly less sloping than the Thebes soil; they are above this soil on the landscape. The included soils make up about 10 to 15 percent of the map unit.

Water and air move through the subsoil at a moderate rate and through the underlying material at a moderately rapid rate. Surface runoff is rapid. The available water capacity is moderate. The organic matter content is low, and natural fertility is medium. The subsoil is slightly acid to very strongly acid. The potential is high for frost action and moderate for shrinking and swelling. The surface layer crusts after rains, and clods form if the soil is cultivated when wet.

In most areas, this soil is cultivated or is used for pasture and hay. This soil has poor potential for cultivated crops. The potential is good for woodland use and for habitat for openland or woodland wildlife. The potential is fair for most recreation uses, for building site development, and for septic tank absorption fields.

This soil is poorly suited to corn, soybeans, and small grains. Erosion is difficult to control because of excessive slope. Seedlings do not grow well because the surface layer crusts and seedbeds are commonly cloddy. Conservation tillage, contour farming, conservation cropping systems, and crop residue help to reduce soil loss. Returning crop residue to the surface and adding other organic material help to increase infiltration and reduce crusting.

This soil is best suited to pasture and hay. A good cover of grasses and legumes is effective in controlling erosion. Good seedbeds are difficult to prepare. If the soil is properly fertilized, seedlings grow well. Proper stocking rates and pasture rotation help to keep pasture plants in good condition. Restricting grazing when this soil is wet helps to reduce surface compaction and surface runoff.

This soil is well suited to use as woodland. A few small areas remain in woodland. Erosion is a hazard to newly planted trees; but erosion can be controlled if organic material is applied to the surface and if a vegetative cover is established as soon as possible.

This soil is well suited to use as habitat for openland and woodland wildlife. In new plantings of grains, grasses, and legumes for openland wildlife habitat, erosion must be controlled.

If this soil is used as septic tank absorption fields, the tile should be placed on the contour for even distribution of the effluent. This soil is moderately limited for use as sites for small buildings by the shrinking and swelling and slope. These limitations can be overcome if the footings and foundations for these structures are properly designed. If this soil is used as sites for local roads and streets the underlying material provides suitable base material.

Erosion is a severe hazard in areas of new construction. Proper grading and ditching of roadsides can help to remove surface water safely. Diversions can be used to control surface runoff for many other types of construction. Adding organic material to the surface and establishing a vegetative cover as soon as possible can help to reduce surface runoff and soil loss.

This map unit is in capability subclass IVe.

242—Kendall silt loam. This is a nearly level, somewhat poorly drained soil on terraces along major streams. Individual areas of this soil are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is grayish brown silt loam about 5 inches thick. The subsoil is silty clay loam about 40 inches thick. It is brown and mottled in the upper part and grayish brown and mottled in the lower part. The underlying material to a depth of 60 inches is grayish brown, yellowish brown, and gray, stratified clay loam, loam, and sandy loam. In places, the subsoil is thicker than is typical, and the underlying stratified material is at a depth of more than 60 inches. In other areas, the surface layer is very dark grayish brown silt loam about 8 inches thick. Some small areas of this soil are subject to rare flooding for brief periods.

Included with this soil in mapping are small areas of well drained Camden and Plano soils and small areas of poorly drained Sexton soils. The Camden and Plano soils are in slightly raised areas. The Sexton soils are in shallow depressions adjacent to this soil. The included soils make up 5 to 10 percent of this map unit.

Water and air move through this soil at a moderate rate. Runoff in cultivated areas is slow. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is strongly acid to slightly acid. The water table is 1 to 2 feet below the surface. The potential is high for frost action and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, small grains, grasses, legumes, and woodland. It has poor potential for building site development and sanitary facilities.

This soil is suited to corn, soybeans, and small grains. Artificial drainage is needed for optimum yields. Good drainage can be provided by open surface ditches. Tile drains, if properly installed, can be used to remove excess water. Returning crop residue to the surface of this soil and adding other organic material help to improve fertility and maintain the organic matter content.

This soil is suited to grasses and legumes for pasture and hay. The growth of roots of legumes is restricted by excess water. Artificial drainage can help to increase the yield of forage crops. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition. Restricting grazing when this soil is wet helps to reduce surface compaction and maintain the tilth of the surface layer.

This soil is suited to use as woodland. Only trees that have a tolerance for excess water should be planted. Plant competition is a moderate hazard. The undesirable vegetation can be controlled by spraying and cutting.

This map unit is in capability subclass IIw.

244—Hartsburg silty clay loam. This is a nearly level, poorly drained soil in slight depressions on upland flats. It is subject to occasional flooding for brief periods in spring. Individual areas of this soil are irregular in shape and range from 5 to 1,000 acres in size.

Typically, the surface soil is black silty clay loam about 13 inches thick. The subsoil is about 26 inches thick. The upper part is very dark gray, mottled silty clay loam; the middle part is dark grayish brown and grayish brown, mottled, calcareous silty clay loam; and the lower part is light brownish gray, mottled, calcareous silt loam. The underlying material to a depth of 66 inches is gray and brown, mottled, calcareous silt loam. In some areas, carbonates are at a depth of as much as 45 inches. In other areas, the depth to carbonates is less than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained Ipava soils. These Ipava soils are in slightly raised areas surrounding the Hartsburg soil. The included soils make up 5 to 12 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is slow or ponded. The available water capacity is very high. The organic matter content and natural fertility are high. The subsoil is neutral or mildly alkaline. The surface layer crusts after rains, and clods form if the soil is cultivated when wet. A seasonal high water table is at the surface. The potential is high for frost action and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops and small grains. It has fair potential for grasses and legumes. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. Excess water restricts the growth of plant roots. Shallow surface ditches and tile drains help to remove excess water. Cultivating this soil at the proper moisture level and returning crop residue to the surface of the soil can help to reduce the formation of clods. Soil blowing is a slight hazard. Conservation tillage and crop residue use can help to reduce this hazard.

This soil is fairly suited to grasses and legumes for pasture and hay. Artificial drainage is needed to remove excess water. Seedlings can be established if the surface layer has a suitable amount of moisture and if the site is properly fertilized. Restricting grazing when the soil is wet helps to keep the pasture plants and the soil in good condition.

This map unit is in capability subclass IIw.

249—Edinburg silty clay loam. This is a nearly level, poorly drained soil on low-lying upland flats. It is subject to occasional flooding for brief periods in spring. Individual areas of this soil are irregular in shape and range from 3 to 15 acres in size.

Typically, the surface soil is very dark gray silty clay loam about 16 inches thick. The subsoil is about 39 inches thick. It is dark gray, mottled silty clay loam in the upper 4 inches; dark gray, mottled silty clay in the middle 6 inches; and dark gray, yellowish brown, and olive gray silty clay loam in the lower 29 inches. The underlying material to a depth of 60 inches is yellowish brown and light olive gray silt loam. In some areas, the surface soil contains more organic matter than is typical; and in a few areas, it is more than 24 inches thick. In other areas, there is a dark grayish brown silt loam subsurface layer about 3 inches thick. In some places, this subsurface layer is gray.

Included with this soil in mapping are small areas of poorly drained Sable soils that are less clayey in the subsoil than the Edinburg soil. Also included are small areas of somewhat poorly drained Ipava soils. These Sable and Ipava soils are in slightly higher lying areas.

Water and air move through this soil at a moderately slow or slow rate. Surface runoff in cultivated areas is slow. The available water capacity is high. The organic matter content is moderate, and natural fertility is high. The subsoil is slightly acid to mildly alkaline. The seasonal water table is at the surface. The potential is high for frost action and for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops and small grains. It has fair potential for pasture and hay and poor potential for building site development and sanitary facilities.

This soil is suited to corn, soybeans, and small grains. Tile inlets and shallow surface ditches can be used to remove excess water from this soil. Tile drains do not function well because of the slow and moderately slow permeability. If this soil is cultivated when wet, the surface layer is cloddy when it dries. Adding crop residue and other organic material to the soil can help to improve the tilth and fertility.

This soil is moderately suited to grasses and legumes for pasture and hay. Excess water in this soil restricts the growth of roots, especially the roots of legumes. Properly designed surface ditches and tile inlets help to reduce excess water. Proper stocking rates help to keep pasture plants in good condition. Grazing this soil when it is wet causes surface compaction and poor tilth.

This map unit is in capability subclass IIw.

259C—Assumption silt loam, 4 to 7 percent slopes. This is a moderately sloping, moderately well drained soil on short side slopes along drainageways on uplands. Individual areas of this soil are narrow and long and range from 5 to 50 acres in size.

Typically, the surface soil is very dark grayish brown silt loam about 14 inches thick. The subsoil extends to a depth of 60 inches. In the upper part it is dark yellowish brown silty clay loam. In the lower part it consists of a buried horizon of gray silty clay loam and clay loam that is mottled with yellow and brown. In places, the depth to this buried soil is more than 40 inches or less than 20 inches. In other places, there is no buried soil, and the underlying material is loess. In some areas the soil is eroded, and plowing has mixed the upper part of the subsoil with the original surface soil. In these areas the surface soil is dark brown light silty clay loam.

Water and air move through the upper part of the subsoil at a moderate rate and through the lower part of the subsoil at a moderately slow rate. Surface runoff in cultivated areas is medium. The available water capacity is high. The organic matter content is high, and natural fertility is medium. The subsoil is medium acid or slightly acid. The potential is high for frost action and moderate for shrinking and swelling. During rainy periods there is a perched water table above the buried soil at a depth of about 30 inches. Excess water causes seepage on hillsides.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and poor potential for sanitary facilities.

This soil is suited to corn, soybeans, small grains, pasture, and hay. If it is used for cultivated crops, erosion is a hazard. Conservation tillage, terraces, contour farming, and conservation cropping systems help to prevent excessive soil loss. Returning crop residue to the soil helps to reduce runoff, increase water infiltration, and improve fertility.

The use of the soil for pasture or hay is also effective in controlling erosion. Grazing when the soil is too wet causes surface compaction and increases runoff. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition.

The proper functioning of septic tank filter fields is severely limited by the moderately slow permeability in the lower part of the subsoil and by the seasonal high water table.

In construction areas, water erosion is a problem. Mulching the soil with organic material and establishing a protective vegetative cover as soon as possible can help to reduce erosion.

If this soil is used as sites for roads and streets, the use of suitable base material can help to prevent damage resulting from shrinking and swelling of the soil and frost action. The sides of roadbeds should be properly graded and ditched to help remove surface water safely.

This map unit is in capability subclass IIe.

259D2—Assumption silt loam, 7 to 15 percent slopes, eroded. This is a strongly sloping, moderately well drained soil along drainageways on uplands. Individual areas of this soil are long and narrow and range from 5 to 75 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of 60 inches. It is dark yellowish brown silt loam in the upper part and dark yellowish brown silty clay loam in the middle part. The lower part consists of a buried horizon that is gray silty clay loam and clay loam mottled with yellow and brown. In places, the depth to the buried soil is less than 20 inches or more than 40 inches. In other places there is no buried soil, and the underlying material is loess. In some areas, plowing has mixed the upper part of the subsoil with the original surface layer, and the surface layer is dark brown light silty clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Radford and Lawson soils. These soils are on the flood plains of drainageways that are too narrow to indicate on the soil maps. The included soils make up 2 to 5 percent of the map unit.

Water and air move through the upper part of the subsoil at a moderate rate and through the lower part of the subsoil at a moderately slow rate. Surface runoff in cultivated areas is rapid. The organic matter content is moderate, and natural fertility is medium. The potential is high for frost action and moderate for shrinking and swelling. The available water capacity is high. The subsoil is medium acid or slightly acid. During rainy periods, there is a perched water table above the buried soil at a depth of about 30 inches. This water table can cause seepage on hillsides.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and poor potential for sanitary facilities.

This soil is suited to corn, soybeans, small grains, hay, and pasture. If this soil is used for cultivated crops, erosion is a severe hazard. Conservation tillage, terraces, contour farming, and conservation cropping systems can help to prevent excessive soil loss. Returning crop residue to the soil can help to reduce runoff, increase water infiltration, and improve fertility.

The use of this soil for pasture or hay is also effective in controlling erosion. Grasses and legumes grow well if the soil is protected from erosion and if it is properly fertilized. Seedlings should become well established before they are grazed, and they should not be overgrazed. Grazing when the soil is wet causes surface compaction, which increases surface runoff and soil loss.

The use of this soil as septic tank absorption fields and as sites for sewage lagoons is severely limited by the steepness of slope, the moderately slow permeability of the lower part of the subsoil, and the seasonal high water table. Because of the moderately slow permeability, this soil is suited to use as pond reservoir areas (fig. 9).

In construction areas, water erosion is a problem. Mulching the soil with organic material and establishing a protective vegetative cover as soon as possible can help to reduce erosion.

If this soil is used as sites for roads and streets the use of suitable base material can help to reduce damage resulting from shrinking and swelling and frost action. Roadbeds should be built on the contour, and their sides

Figure 9.—Assumption silt loam, 7 to 15 percent slopes, eroded, is well suited to use as pond reservoir areas.

should be properly graded to help remove surface water safely.

This map unit is in capability subclass IIIe.

280B—Fayette silt loam, 2 to 4 percent slopes. This is a gently sloping, well drained soil on convex ridgetops and on knolls and along drainageways. Individual areas of this soil are irregular in shape and range from 3 to 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 49 inches thick. It is dark yellowish brown silty clay loam in the upper 20 inches; yellowish brown silty clay loam in the middle 22 inches; and yellowish brown, mottled silt loam in the lower 7 inches. The underlying material to a depth of 70 inches is yellowish brown, mottled silt loam. In some places, the soil has slopes of less than 2 percent and has gray mottles in the subsoil. In some of these places, the surface layer is dark and about 8 inches thick. In other places, the subsoil is thinner than is typical, and it is underlain by loamy fine sand below a depth of 45 inches.

Included with this soil in mapping are small areas of nearly level, somewhat poorly drained Keomah soils. These soils are adjacent to the Fayette soil on the landscape, and they make up 2 to 5 percent of the map unit.

Permeability is moderate in this soil. Surface runoff is slow. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is very strongly acid and strongly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, pasture, woodland use, and most kinds of wildlife habitat. It has fair potential for building site development and sanitary facilities.

This soil is suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. If it is used for cultivated crops, water erosion and soil blowing are slight hazards. Terraces, contour farming, conservation tillage, and conservation cropping systems help to reduce soil loss. Returning crop residue to the soil and regularly adding other organic material help to improve fertility and increase water infiltration.

The use of this soil for pasture or hay helps to reduce soil loss. Grasses and legumes, especially alfalfa, grow well on this soil. Proper fertilization, proper stocking rates, and pasture rotation help to keep the pasture plants and the soil in good condition. New seedlings need to become well established before the pasture is grazed.

This soil is well suited to use as woodland. A few areas remain in woodland. Competing vegetation can be controlled by preparing the site well before planting and by spraying and cultivating. There are no significant limitations to the planting or harvesting of trees.

This soil is well suited to use as habitat for woodland and openland wildlife.

This soil is moderately suitable for onsite waste disposal systems. If it is used as sites for sewage lagoons, seepage is a hazard. Seepage can be reduced by sealing the bottom of the lagoons. Slope is also a hazard, and some grading is required. The clay in the subsoil is a moderate limitation to the use of this soil as sites for sanitary landfills. Septic tank absorption fields must be large enough to allow for the slow rate of permeability. Buildings and foundations need to be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, the use of suitable base material can help to prevent damage resulting from frost action and shrinking and swelling.

If this soil is disturbed by construction, water erosion is a hazard. Soil loss can be reduced by applying organic material to the surface and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IIe.

280C2—Fayette silt loam, 4 to 7 percent slopes, eroded. This is a moderately sloping, well drained soil on convex ridgetops and along drainageways. Individual areas of this soil are mainly long and range from 3 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. It is mixed with some of the subsoil. The subsoil is dark yellowish brown and yellowish brown, and it is about 42 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is silt loam. The underlying material to a depth of about 65 inches is yellowish brown silt loam. In some noncultivated areas, the surface layer and a subsurface layer make up the upper 10 to 12 inches. In places, the upper part of the subsoil has been mixed with the surface layer by plowing, and the surface layer is dark yellowish brown silty clay loam. In a few small areas, slopes are less than 4 percent. In a few areas, loamy fine sand and fine sand are at a depth below 45 inches. In other areas, calcareous loess is within a depth of 30 or 40 inches. In a few places, the subsoil is more sandy than is typical.

Included with this soil in mapping are small areas of moderately well drained Thebes soils. These soils are on slopes along drainageways. The included soils make up 10 to 15 percent of the map unit.

Permeability is moderate in this soil. Surface runoff is medium. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is medium acid to very strongly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, pasture, woodland use, and most kinds of wildlife habitat. It has fair potential for building site development and septic tank absorption fields.

This soil is suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. If it is used for cultivated crops, water erosion is a hazard. Conservation tillage, terraces, contour farming, and conservation cropping systems help to reduce soil loss. Returning crop residue and adding other organic material to the soil can help to improve fertility, increase water infiltration, and reduce soil loss.

Grasses and legumes, especially alfalfa, grow well on this soil. The use of this soil for pasture or hay can help to reduce soil loss. Proper fertilization, proper stocking rates, and pasture rotation can help to keep the pasture plants and the soil in good condition. New seedlings need to become well established before the pasture is grazed.

This soil is well suited to use as woodland. A few areas remain in woodland. Competing vegetation can be controlled by preparing the site properly before planting and by spraying and cultivating. The hazard of erosion is the main limitation to planting or harvesting trees.

This soil is well suited to use as habitat for openland wildlife. Grains, grasses, and legumes are easy to establish, and they grow well. The few areas now in woodland provide habitat for woodland wildlife.

If septic tank absorption fields are installed in this soil, they need to be designed to compensate for the moderate permeability of the soil. The steep slopes and seepage are limitations to the use of this soil as sites for sewage lagoons. Seepage can be reduced by sealing the bottom of the lagoons. The clay in the subsoil is a moderate limitation for sanitary landfills.

This soil is suited to building site development; however, footings and foundations should be designed to withstand the moderate shrinking and swelling of the soil. If this soil is used as sites for local roads and streets, the use of proper base material can help to reduce damage resulting from frost action and shrinking and swelling. If this soil is disturbed by construction, water erosion is a hazard. This hazard can be reduced by applying organic material to the surface and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IIIe.

280D2—Fayette silt loam, 7 to 15 percent slopes, eroded. This is a strongly sloping, well drained soil along drainageways and on convex ridges. Individual areas of this soil are mainly long and range from 5 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. It is mixed with some of the subsoil. The subsoil is yellowish brown, and it is about 37 inches thick. It is silty clay loam in the upper part and silt loam in the lower part. The underlying material to a depth of about 60 inches is yellowish brown silt loam. In some areas, so much of the upper part of the subsoil has been mixed with the surface layer by plowing that the surface layer is dark yellowish brown silty clay loam. In some places, the slope of the soil is as much as 22 percent. In some areas, the surface layer is about 11 inches thick. In other areas, calcareous loess is within a depth of 30 inches. In a few areas, mottled clay loam till is below a depth of 40 inches. In a few areas, loamy fine sand and fine sand are below a depth of 35 inches. In places, the subsoil is more sandy than is typical.

Permeability is moderate in this soil. Surface runoff is rapid. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is medium acid to strongly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few areas, it is used for pasture or as woodland. This soil has fair potential for cultivated crops and good potential for hay, pasture, and woodland use. It has good potential for wildlife habitat and fair potential for building site development and septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains if extensive conservation practices are used. Conservation tillage, terraces, contour farming, and conservation cropping systems can help to reduce soil loss. Returning crop residue and adding other organic material to the soil help to prevent erosion by increasing water infiltration and help to improve fertility.

This soil is well suited to grasses and legumes, especially alfalfa, for hay and pasture. The cover provided by these plants can control erosion. This vegetative cover can be maintained if the soil is properly fertilized. Terraces and diversions can be used in many places to help control surface runoff. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition. New seedlings need to become well established before the pasture is grazed.

This soil is well suited to use as woodland. Some areas now in woodland are well stocked with trees. Wood production can be increased by removing diseased trees and trees that are too closely spaced and by pruning. Weeds and grass can be controlled by spraying and cultivating.

This soil is well suited to habitat for woodland and openland wildlife.

Septic tank absorption fields function properly on this soil if the tile is placed on the contour to offset the slope. Absorption fields need to be designed to offset the moderate permeability of the soil. This soil is not suited to use as sites for sewage lagoons because of the slope.

Buildings should be constructed to offset the slope, and footings and foundations should be designed to withstand the moderate shrinking and swelling of this soil. Water erosion is a hazard in areas of new construction. A protective vegetative covering should be established as soon as possible to help reduce this hazard.

Roads and streets constructed on this soil need suitable base material to help reduce damage resulting from the shrinking and swelling of the soil and frost action in the soil. In areas of new construction, adding organic material to the surface of the soil helps to reduce soil loss caused by water erosion.

This map unit is in capability subclass IIIe.

280D3—Fayette silty clay loam, 7 to 15 percent slopes, severely eroded. This is a strongly sloping, well drained soil along drainageways and on convex ridges. Individual areas of this soil are mainly long and range from 3 to 75 acres in size.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil is yellowish brown, and it is about 36 inches thick. It is silty clay loam in the upper part and silt loam in the lower part. The underlying material to a depth of about 60 inches is yellowish brown silt loam. In some places, the surface layer is dark grayish brown silt loam. In places, the slope is as steep as 22 percent. In other places, calcareous loess is within a depth of 30 inches. In a few areas, mottled clay loam till is below a depth of 30 inches. In places, the subsoil is more sandy than is typical.

Water and air move through this soil at a moderate rate. Surface runoff is rapid. The available water capacity is high. The surface layer crusts after rains. The organic matter content is low, and natural fertility is medium. The subsoil is neutral to strongly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few areas, it is used for pasture. This soil has poor potential for cultivated crops, and good potential for hay, pasture, and woodland. It has good potential for wildlife habitat and fair potential for building site development and septic tank absorption fields.

This soil is poorly suited to corn, soybeans, and small grains. The slopes are excessive and short and are difficult to protect from erosion.

This soil is suited to grasses and legumes for hay and pasture. Proper fertilization helps to maintain a good vegetative cover, which is effective in controlling erosion. Good seedbeds are difficult to prepare because of the clay in the surface layer. In places, diversions can be used to control surface runoff. Proper stocking rates and pasture rotation can help to keep the pasture plants and the soil in good condition. Restricting grazing when the soil is wet can help to reduce surface compaction and surface runoff.

This soil is suited to use as woodland. Adding organic material to the soil helps to reduce erosion by increasing water infiltration and slowing surface runoff. Trees should be planted on the contour to control erosion, and they should be planted when the surface layer is dry.

This soil is well suited to habitat for openland and woodland wildlife. If grains, grasses, and legumes for food and cover are planted, erosion is a hazard. The use of properly placed diversions can help to control erosion. Grassed waterways with proper outlets can help to remove surface water safely.

Septic tank absorption fields function properly on this soil if the tile is placed on the contour to offset the slope. Absorption fields need to be designed to compensate for the moderate permeability of the soil. This soil is poorly suited to use as sites for sewage lagoons because of the excessive slope. Buildings can be designed to offset the slope. Footings and foundations should be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, suitable base material is needed to reduce the damage resulting from shrinking and swelling and frost action.

In areas of new construction, erosion is a severe hazard. To reduce soil loss, organic material should be applied to the surface, and a good vegetative cover should be established as soon as possible.

This map unit is in capability subclass IVe.

284—Tice silty clay loam. This is a nearly level, somewhat poorly drained soil on the bottom land of streams and rivers. It is subject to occasional flooding for brief periods in spring. Individual areas of this soil are irregular in shape and range from 20 to 400 acres in size.

Typically, the surface soil is very dark grayish brown silty clay loam about 29 inches thick. The subsoil is dark grayish brown, mottled silty clay loam about 31 inches thick. The underlying material to a depth of 60 inches is dark brown and grayish brown loam. In some areas, the subsoil is thinner than is typical, and loamy sand and sand are at a depth of 20 inches or more. In other small areas, the soil material to a depth of 60 inches consists of loamy sand and sandy loam. In a few areas, the surface layer is more than 24 inches thick. In other areas, a black buried soil is within a depth of 20 to 40 inches.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is slow. The available water capacity is high. The organic matter content is moderate, and natural fertility is high. The subsoil is neutral or slightly acid. The potential is high for frost action and moderate for shrinking and swelling. During the wet season, the water table is within 1 to 3 feet of the surface. The surface soil crusts after rains, and clods form if this soil is cultivated when it is wet.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. Underground tile or shallow surface ditches can be used to remove excess water. Returning crop residue to the soil and cultivating the soil at the proper moisture content can help to reduce surface crusting and prevent the formation of clods.

This soil is suited to grasses and legumes for pasture and hay. Excess water restricts the growth of roots, especially the roots of legumes. Excess water can be removed by artificial drainage. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition. Restricting grazing when this soil is wet helps reduce surface compaction and maintain the tilth of the surface layer.

If this soil is used as sites for roads, suitable base material is needed to prevent damage from frost action in the soil and the shrinking and swelling of the soil. Roads should be built above the level of flooding.

This map unit is in capability subclass IIw.

451—Lawson silt loam. This is a nearly level, somewhat poorly drained soil that is commonly on the bottom land of streams and rivers. It is subject to occasional flooding for brief periods from March to November. Individual areas of this soil are long and narrow and range from 10 to 100 acres in size.

Typically, the surface layer is very dark brown silt loam 5 inches thick. The subsurface layer is silt loam about 36 inches thick. It is black in the upper part and very dark gray and very dark grayish brown in the lower part. The underlying material to a depth of 60 inches is dark grayish brown silt loam. In places, the subsurface layer is thinner than is typical, and the underlying material is silty clay loam. In a few areas the surface layer is black loam 10 to 15 inches thick.

Included with this soil in mapping are small areas of poorly drained Sawmill soils in lower lying areas. The included soils make up about 5 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff is slow. The available water capacity is very high. The organic matter content is high, and natural fertility is high. The surface and subsurface layers are slightly acid or neutral. The high water table is at a depth of 1 to 3 feet during the wet season. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated or is in pasture. In a few areas, it is used as woodland. The areas of this soil that are in pasture or woodland are too narrow or too dissected with drainageways to permit the use of farm machinery. This soil has good potential for cultivated crops, pasture, and hay. It has poor potential for building site development and sanitary facilities.

This soil is well suited to corn, soybeans, and small grains. Tile drains can adequately remove excess water. Diversions can help to control surface runoff in a few areas.

This soil is suited to grasses and legumes for pasture and hay. The excess water restricts the growth of roots, especially the roots of legumes. Artificial drainage helps to maintain plants for forage. Preventing overgrazing and restricting grazing during wet periods help to keep the pasture plants and the soil in good condition.

This map unit is in capability subclass IIw.

533—Urban land. This map unit consists of nearly level and gently sloping soil material that is almost completely covered by streets, parking lots, buildings, and other structures. The largest area is in the north-central part of the city of Springfield. There is a small area in the southwestern part of Springfield and several small areas about 2 miles west of the city of Illiopolis. This map unit is 85 to 95 percent Urban land and about 5 to 10 percent open areas of soils that are so altered that identification is not feasible.

Included in mapping are a few very small areas of poorly drained Hartsburg and Sable soils, somewhat poorly drained Ipava soils, and well drained Tama soils. In many areas, these soils have been covered with soil material from excavations, or they have been mixed with bricks, cinders, or concrete. The included soils make up about 2 to 5 percent of the map unit.

Most areas of this map unit are drained by a public sewer system. A few low-lying areas are flooded by runoff from adjacent higher areas. In some areas the water table is within 1 to 3 feet of the surface during the wet season.

The included soils are suited to grass, flowers, trees, and shrubs. Perennial plants that are selected for planting on these soils should have a tolerance for wetness because these soils are excessively wet. The soil material in a few open areas is suitable for building site development.

This miscellaneous area is not assigned to an interpretative grouping.

551F—Gosport silt loam, 18 to 50 percent slopes. This is a steep and very steep, well drained soil along major streams. Individual areas are long and narrow and range from 5 to 150 acres in size.

Typically, the surface layer is very dark gray silt loam about 3 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil is light olive brown, and it is about 23 inches thick. The upper 6 inches is silt loam, and it contains a few shale fragments. The lower 17 inches is silty clay loam; shale fragments are common throughout. The underlying material is shale bedrock. In some areas, the surface layer is grayish brown. In other areas, the depth to shale bedrock ranges from 0 to 20 inches. In places, the surface layer and the upper part of the subsoil are brown loamy material.

Included with this soil in mapping are small areas of deep, well drained Hickory and Fayette soils and moderately well drained Elco soils. These included soils are on side slopes mainly above this Gosport soil. The included soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a very slow rate. Surface runoff is rapid. The available water capacity is moderate. The organic matter content is moderately low, and natural fertility is low. The subsoil is very strongly acid to neutral. The potential for shrinking and swelling is high. Root growth is restricted by the underlying rock.

In most areas, this soil is used as woodland. In a few areas, it is used for pasture. This soil has poor potential for cultivated crops, hay, pasture, recreation uses, building site development, and sanitary facilities. It has fair potential for woodland use and as habitat for woodland wildlife.

This soil is not suited to corn, soybeans, small grains, pasture, and hay because of excessive slope and a severe hazard of erosion.

This soil has fair suitability for use as woodland. Tree seeds and seedlings are difficult to establish. Erosion is a severe hazard to all new plantings, but applying organic material to the surface of the soil can help to reduce soil loss. The underlying rock restricts the growth of tree roots. Competing vegetation can be controlled by spraying and cutting. The excessive slope is a severe limitation to the use of machines for planting and harvesting trees.

This soil has fair suitability for woodland wildlife habitat. Grains, grasses, and legumes, which provide habitat for openland wildlife, grow in some areas of this map unit, but they are difficult to establish and maintain because of the excessive slope and the severe hazard of erosion.

This map unit in capability subclass VIIe.

567C—Elkhart silt loam, 4 to 7 percent slopes. This is a moderately sloping, well drained soil along drainageways on uplands. Most areas of this soil are long and narrow, but a few are irregular in shape. They range in size from 5 to 50 acres.

Typically, the surface layer is very dark grayish brown silt loam 9 inches thick. The subsurface layer is dark brown heavy silt loam 5 inches thick. The subsoil is dark brown and yellowish brown, and it is about 15 inches thick. It is silty clay loam in the upper 9 inches and silt loam in the lower 6 inches. The underlying material to a depth of 60 inches is yellowish brown and light gray, calcareous silt loam. In places, the upper part of the subsoil has been mixed with the surface layer by plowing, and the surface layer is dark brown, heavy silt loam about 9 inches thick. In other places, this soil is severely eroded, and it is calcareous silt loam throughout. In places, the subsoil is thicker than is typical, and carbonates are below a depth of 50 inches. In a few areas, mottled clay loam till is below a depth of 25 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Radford soils. These Radford soils are on the flood plains of drainageways that are too narrow to delineate on soil maps. The included soils make up 10 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is medium. The available water capacity is very high. The organic matter content is moderate, and natural fertility is medium. The subsoil is medium acid to mildly alkaline. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, and small grains. If this soil is used for cultivated crops, erosion is a hazard. Conservation tillage, terraces, contour farming, and conservation cropping systems help to reduce soil loss. Adding organic material and returning crop residue to the soil help to improve fertility, increase infiltration, and reduce soil loss.

This soil is well suited to grasses and legumes, especially alfalfa, for pasture and hay. A good cover of grasses and legumes is very effective in controlling erosion. If the soil is properly fertilized, seedlings are easy to establish and to maintain. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition.

This soil is suitable for septic tank absorption fields. It is moderately limited for use as sites for sewage lagoons by slope and seepage. Sealing the bottom of lagoons can reduce seepage.

The slope and the shrinking and swelling of the soil are moderate limitations for buildings. Foundations and footings need to be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, suitable base material is needed to reduce the damage resulting from frost action and the low strength of the soil. Erosion is a hazard in areas of new construction. If organic material is applied to the surface and if a vegetative cover is established as soon as possible in these areas, soil loss can be reduced.

This map unit is in capability subclass IIe.

567D2—Elkhart silt loam, 7 to 15 percent slopes, eroded. This is a strongly sloping, well drained soil along drainageways on uplands. Individual areas of this soil are commonly long and narrow, and they range from 15 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is yellowish brown, and it is about 17 inches thick. It is silty clay loam in the upper 9 inches and silt loam in the lower 8 inches. The underlying material to a depth of 60 inches is yellowish brown and gray, calcareous silt loam. In places, the upper part of the subsoil has been mixed by plowing with the surface layer, and the surface layer is brown light silty clay loam. In other places, the surface layer and the subsoil are calcareous silt loam. In places, the subsoil is thicker than is typical, and carbonates are below a depth of 40 inches. In a few areas, mottled clay loam till is below a depth of 25 inches.

Included with this soil in mapping are small areas of somewhat poorly drained Radford soils. These Radford soils are on flood plains of drainageways that are too narrow to delineate on the soil maps. The included soils make up 5 to 15 percent of the map unit.

Water and air move through this soil at a moderate rate. Surface runoff in cultivated areas is medium. The available water capacity is very high. The organic matter content is moderate, and natural fertility is medium. The subsoil is medium acid to mildly alkaline. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has fair potential for cultivated crops and good potential for hay and pasture. It has fair potential for building site development and septic tank absorption fields.

This soil is suited to corn, soybeans, and small grains. Erosion is a hazard if this soil is used for cultivated crops. Conservation tillage, terraces, contour farming, and conservation cropping systems help to prevent excessive soil loss. Returning crop residue to the soil and adding other organic material help to improve fertility, increase infiltration, and reduce soil loss.

This soil is well suited to grasses and legumes, especially alfalfa, for pasture and hay. A good cover of grasses and legumes is very effective in controlling erosion. If the soil is properly fertilized, seedlings are easy to establish and to maintain. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition.

This soil is suitable for septic tank absorption fields if the tiles are placed on the contour to offset the slope. The excessive slope severely limits this soil for use as sites for sewage lagoons.

This soil is suitable for building site development. Buildings can be designed to offset the slope and withstand the shrinking and swelling of the soil.

Frost action and low strength are severe limitations to the use of this soil as sites for roads and streets. The use of proper base material can help to overcome these limitations. The hazard of erosion is also a limitation. In areas of new construction, soil loss can be reduced by applying organic material to the surface and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IIIe.

684B—Broadwell silt loam, 2 to 4 percent slopes. This is a gently sloping, well drained soil on ridgetops and along drainageways on uplands. Individual areas of this soil are mainly narrow and long; some are irregular in shape. These areas range from 3 to 40 acres in size.

Typically, the surface soil is very dark gray silt loam about 14 inches thick. The subsoil is about 46 inches thick. It is dark yellowish brown silty clay loam and has some yellowish brown and gray mottles to a depth of 55 inches. The underlying material to a depth of 60 inches is dark yellowish brown, mottled loamy sand. In places, the subsoil is 20 to 40 inches thick, and the underlying material is loamy sand and sand. In other places, the surface soil is loam or sandy loam. In a few areas the surface layer is less than 10 inches thick.

Water and air move through the surface soil and the subsoil at a moderate rate, and through the underlying material at a rapid rate. Surface runoff in cultivated areas is slow. The available water capacity is high. The organic matter content is moderate, and natural fertility is high. The subsoil is neutral to medium acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is suited to corn, soybeans, small grains, hay, and pasture. If it is used for cultivated crops, soil blowing and water erosion are hazards. Conservation tillage, terraces, conservation cropping systems, and contour farming help to reduce soil loss. Returning crop residue to the soil helps improve the water intake rate and the fertility of the soil. Grassed waterways that have proper outlets help remove surface runoff safely.

The use of this soil for pasture or hay is also effective in controlling erosion. Grasses and legumes, especially alfalfa, grow well on this soil. Proper fertilization helps to maintain pasture plants. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition.

This soil is well suited to use as septic tank absorption fields. However, nearby ground water can be contaminated by seepage through the underlying sandy material. Seepage from sewage lagoons and sanitary landfills is a severe hazard. This hazard can be reduced by sealing the bottom of the lagoons and landfills.

The footings and foundations of buildings need to be designed to withstand the shrinking and swelling of the soil. If this soil is used as sites for roads and streets, using suitable base material and properly grading the roadbed can help reduce the damage resulting from frost action in the soil and the shrinking and swelling of the soil. In areas of new construction, water erosion is a hazard. This hazard can be reduced if organic residue is applied to the surface and if a vegetative cover is established as soon as possible.

This map unit is in capability subclass IIe.

684C2—Broadwell silt loam, 4 to 7 percent slopes, eroded. This is a moderately sloping, well drained soil along drainageways and on convex ridges on uplands. Individual areas of this soil are mainly narrow and long and range from 5 to 45 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsoil is about 40 inches thick. It is dark yellowish brown silty clay loam. There are a few gray mottles below a depth of 40 inches. The underlying material to a depth of 60 inches is dark yellowish brown loamy fine sand or fine sand. In places, the subsoil is thinner than is typical. In some areas, the subsoil has been mixed with the surface layer by plowing, and the surface layer is dark brown silty clay loam. The surface layer is loam in some areas. In other areas, the surface layer is less than 10 inches thick, and loamy sand and sand are below a depth of 30 to 40 inches.

Included with this soil in mapping are small areas of moderately sloping, well drained Alvin soils on ridges. The Alvin soils are more sandy and less clayey throughout than the Broadwell soil. The included soils make up 5 to 10 percent of the map unit.

Water and air move at a moderate rate through the subsoil and at a rapid rate through the underlying material. Surface runoff in cultivated areas is medium. The available water capacity is high. The subsoil is slightly acid to medium acid. The organic matter content is moderate, and natural fertility is high. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. This soil has good potential for cultivated crops, hay, and pasture. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is suited to corn, soybeans, small grains, and hay and pasture. If it is used for cultivated crops, water erosion is a hazard. Conservation tillage, terraces, contour farming, and conservation cropping systems help to reduce soil loss by erosion. Returning crop residue to the soil helps to increase water infiltration and reduce soil blowing. Grassed waterways that have proper outlets can remove surface runoff safely.

The use of this soil for pasture or hay is also effective in controlling erosion. Legumes, especially alfalfa, grow well on this soil. Terraces can be used to reduce soil loss. Proper stocking rates and pasture rotation help to keep the pasture plants and the soil in good condition.

This soil is suited to use as septic tank absorption fields. However, ground water can be contaminated by seepage through the underlying sandy material. If this soil is used as sites for sewage lagoons and sanitary landfills, seepage is a severe problem because of the underlying sandy material. Excessive seepage can be prevented by sealing the bottom of the lagoons and landfills. This soil is also limited for use as sites for sewage lagoons because of slope.

The footings and foundations of buildings need to be designed to withstand the shrinking and swelling of the soil. Frost action and shrinking and swelling reduce the strength and stability of the soil for use as sites for local roads and streets. The strength and stability can be increased by using suitable base material. If this soil is disturbed by construction, water erosion is a hazard. Soil loss can be reduced by covering the surface with organic material and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IIe.

685B—Middletown silt loam, 1 to 4 percent slopes. This is a gently sloping, well drained soil on convex ridges and knolls, along drainageways, and in broad areas on uplands. Individual areas of this soil are irregular in shape and range from 3 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is yellowish brown silt loam about 3 inches thick. The subsoil is dark yellowish brown, and it is about 40 inches thick. It is silty clay loam in the upper part and clay loam and loamy fine sand in the lower part. The underlying material to a depth of 60 inches is dark yellowish brown fine sand. In places, the subsoil is thinner than is typical, and fine sand is at a depth of 25 inches. In other places, the subsurface layer has been mixed with the surface layer by plowing, and the surface layer is brown silt loam. In a few areas, the soil has slopes of less than 1 percent. In other areas, it is silt loam or silty clay loam throughout.

Included with this soil in mapping are small areas of well drained Alvin soils on convex ridgetops and along drainageways. The Alvin soils are more sandy and less clayey throughout than this Middletown soil. Included soils make up about 5 to 10 percent of the map unit.

Water and air move through the subsoil at a moderate rate and through the underlying material at a rapid rate. Surface runoff is slow. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is very strongly acid to slightly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few areas, it is used for pasture or as woodland. This soil has good potential for cultivated crops, pasture, hay, woodland use, most recreation uses, and wildlife habitat. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, and small grains. Water erosion is a hazard, and soil blowing is a slight hazard. Conservation tillage, terraces, and grassed waterways with proper outlets can help to reduce soil loss. Winter cover crops and crop residue left on the surface help to reduce soil blowing.

Grasses and legumes for pasture and hay grow well on this soil and help to control erosion. If the soil is properly fertilized, seedlings are easily established. Proper stocking rates and pasture rotation can help to keep the pasture plants in good condition.

This soil is well suited to use as woodland. The only hazard is plant competition, which can be reduced by properly preparing the site before planting and by spraying and cutting after planting. There are no restrictions to the use of machines in planting and harvesting trees.

This soil is well suited to habitat for openland and woodland wildlife. The plants and trees that provide food and cover are easily established.

Septic tank absorption fields work well in this soil. However, there is a hazard of contaminating nearby ground water. Seepage is a severe hazard if this soil is used as sites for sewage lagoons and sanitary landfills. Sealing the bottom of lagoons helps to reduce this hazard.

This soil is suitable for building site development. The shrinking and swelling and low strength of the soil are moderate limitations to this use. The footings and foundations of buildings need to be designed to overcome these limitations. The use of suitable base material can help to reduce the damage to roads and streets resulting from frost action in the soil and the low strength of the soil.

Erosion is a hazard in areas of new construction. Erosion can be controlled by applying organic material to the surface and by establishing a vegetative cover as soon as possible.

This map unit is in capability subclass IIe.

685C2—Middletown silt loam, 4 to 7 percent slopes, eroded. This is a moderately sloping, well drained soil on ridges and knolls and along drainageways on uplands. Individual areas of this soil are commonly long and narrow; a few are circular or irregular in shape. Individual areas range from 3 to 75 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is dark yellowish brown, and it is about 38 inches thick. The upper part is silty clay loam; and the lower part is clay loam, sandy loam, and loamy fine sand. The underlying material to a depth of 60 inches is dark yellowish brown fine sand. In places, the subsoil is thinner than is typical, and fine sand is at a depth of 20 inches. In other places the solum and the underlying material are loess. In some areas, the upper part of the subsoil has been mixed with the surface layer by plowing, and the surface layer is brown silty clay loam. In a few areas, slopes range to 12 percent. In other areas, mottled clay loam till is below a depth of 30 inches.

Included with this soil in mapping are small areas of well drained Alvin soils on ridges. The Alvin soils are more sandy and less clayey throughout than this Middletown soil. The included soils make up about 5 percent of the map unit.

Water and air move through the subsoil at a moderate rate and through the underlying material at a rapid rate. Surface runoff is medium. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The subsoil is strongly acid to slightly acid. The potential is high for frost action and moderate for shrinking and swelling.

In most areas, this soil is cultivated. In a few areas, it is used for pasture or as woodland. This soil has good potential for cultivated crops, pasture, hay, woodland, most kinds of recreation uses, and most kinds of wildlife habitat. It has fair potential for building site development and good potential for septic tank absorption fields.

This soil is well suited to corn, soybeans, and small grains if erosion is controlled. Soil blowing is a slight hazard on ridges and knolls. Terraces, contour farming, conservation tillage, conservation cropping systems, and crop residue can help reduce soil loss.

Grasses and legumes for pasture and hay grow well on this soil, and they help to control erosion. Proper fertilization helps to establish seedlings and to maintain pasture plants. Proper stocking rates and pasture rotation help to keep the pasture plants in good condition.

This soil is well suited to use as woodland. Plant competition is a moderate limitation to this use. This limitation can be reduced by properly preparing the site before planting and by spraying and cutting competing plants. There are no restrictions to the use of equipment in planting and harvesting trees.

This soil is well suited to habitat for openland and woodland wildlife. The plants, trees, and shrubs that provide food and cover for openland wildlife are easily established.

Septic tank absorption fields work well in this soil. However, there is a hazard of contaminating nearby ground water. Excessive seepage is a severe hazard to the use of this soil as sites for sewage lagoons and sanitary landfills. Sealing the bottom of lagoons helps to reduce seepage.

This soil is suited to building site development. Shrinking and swelling and low strength are moderate limitations to this use. The footings and foundations of buildings need to be designed to overcome these limitations. The use of suitable base material in roadbeds helps to reduce the damage resulting from frost action in the soil and the low strength of the soil.

Water erosion is a hazard in areas of new construction. The addition of organic material to the soil and the establishment of a vegetative cover as soon as possible can help to reduce surface runoff and erosion.

This map unit is in capability subclass IIe.

801—Orthents, silty. These are moderately sloping and strongly sloping, well drained soils. They are on side slopes along Clear Creek, about 2 miles southwest of Mechanicsburg. This area was a proving ground for heavy construction equipment. It is 175 acres in size.

Typically, the surface layer is dark yellowish brown silty clay loam or silt loam about 4 inches thick. The subsoil is dark yellowish brown silty clay loam about 39 inches thick. The underlying material to a depth of 60 inches is dark yellowish brown silt loam. In places, the surface layer and subsoil are clay loam.

Included in mapping are small areas of well drained Hickory soils. These included soils make up 2 to 5 percent of the map unit.

Water and air move through the soil at a slow rate. The available water capacity is high. The organic matter content is low, and natural fertility is medium. The subsoil is moderately alkaline. The potential is high for frost action and moderate for shrinking and swelling. The surface layer crusts after rains. The subsoil is very firm and compact and has high bulk density because of compaction by heavy machinery.

These soils are commonly idle. They have poor potential for cultivated crops, pasture, and hay, fair potential for building site development, and poor potential for septic tank absorption fields. The potential is fair for woodland use.

Grasses and legumes grow poorly on these soils. The preparation of a good seedbed is difficult because of crusting in the surface layer. Root growth is restricted by the compact and dense subsoil. Seedlings should be well established before grazing is allowed. Proper fertilization, proper stocking rates, and pasture rotation help to improve the growth of pasture plants. If grazing is restricted when this soil is wet, the crusting of the surface layer and surface runoff can be reduced.

These soils are suited to use as woodland, but tree seedlings are difficult to establish. The compact and dense subsoil restricts the growth of tree roots. The site should be well prepared before planting. Competing vegetation can be controlled by spraying. Soil loss from water erosion can be reduced by applying organic material to the soil. The surface layer is slippery and sticky when wet; therefore, it should be allowed to dry before machines are used to plant trees. There are no other limitations to the planting or harvesting of trees.

The slow permeability is a severe limitation to the use of these soils as septic tank absorption fields. This limitation can be overcome by increasing the size of the absorption field. Only the less sloping areas are suited to use as sites for sewage lagoons. The slope and the excessive clay are limitations to the use of these soils as sites for sanitary landfills.

The foundations of buildings need to be designed to withstand the shrinking and swelling of the soil and frost action in the soil.

If these soils are used as sites for local roads and streets, the use of suitable base material helps to reduce the damage resulting from frost action. These soils erode rapidly in construction areas if they are not quickly seeded and fertilized. Adding organic material to the soil helps reduce erosion.

This map unit is in capability subclass IVe.

862—Pits, sand. This map unit consists of excavations from which sand is removed for use in concrete and as road fill and for other uses. Small excavations dot the uplands along the Sangamon River north of Springfield. Larger excavations are common on the terraces and bottom lands of the Sangamon River and the South Fork of the Sangamon River. Individual areas are commonly 3 to 80 acres in size.

Included in mapping are areas surrounding the pits. The soils in these areas have been disturbed by grading or by sand processing operations. The soils cannot be identified.

The pits in the uplands are about 15 to 20 feet deep. The pits in other areas are deeper, and most are filled with water. The soil material surrounding the pits is sandy or loamy. It is generally low in organic matter content and medium in fertility. In a few areas, this soil material supports willow or silver maple trees. In other areas the soil material is bare or has a cover of weeds or grass.

If reclaimed, the pits have several uses. Onsite investigation is needed to determine the feasibility of reclamation for a specific use. Most pit areas can be reclaimed by filling the pits with suitable solid refuse and covering that with good soil material. Excessive seepage is a hazard. Fill material should be allowed to settle and compact. The reclaimed areas should be suitable for houses, commercial buildings, or industrial sites.

Other pits on bottom lands and terraces are suitable for use as lakes. The lakes can provide good fishing if they are stocked with fish and properly managed. The areas surrounding the lakes are suitable for recreation.

This map unit is not assigned to an interpretative grouping.

864—Quarry. This map unit consists of open excavations and spoil piles where limestone has been mined. In several areas southeast of Springfield, shale as well as limestone has been mined. A quarry is commonly 10 to 50 acres in size, and the excavations are about 50 to 100 feet deep. The quarries are mainly on horizontal layers of bedrock.

Included in mapping are areas, surrounding the pits, of soils that have been mixed with rock fragments and other debris during mining operations. These soils contain many rock fragments of various sizes. The available water capacity is low. The organic matter content is low, and natural fertility is medium.

The limestone and shale were used as building stone and for road construction and other uses. The quarries are no longer used, and unless they are reclaimed they generally are not suitable for most uses. Onsite investigation is necessary to determine the feasibility of reclamation for a specific use.

For most uses, reclamation involves filling the excavations. Most of these excavations could be used as a landfill, but only solid refuse should be deposited because seepage through the fractured bedrock is a hazard. After the excavations are filled with refuse, they should be covered with a thick layer of good soil material. A suitable topsoil should be added. After these improvements have been made, most areas should be suitable for building site development or for recreation use.

This map unit is not assigned to an interpretative grouping.

2036B—Urban land-Tama complex, 1 to 5 percent slopes. This complex consists of areas of Urban land and of gently sloping, well drained Tama soils on ridges, in broad, sloping areas, and along drainageways. Individual areas of this complex range from 50 to 250 acres in size. This complex is 60 to 85 percent Urban land and 15 to 30 percent Tama soils. Urban land and Tama soils are in areas so intricately mixed or in areas so small that it was not practical to separate them in mapping.

Urban land is covered by streets, sidewalks, buildings, and other structures that obscure or so alter the soils that identification is not possible.

Typically, the surface layer of the Tama soils is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 48 inches thick. The upper part is dark brown and dark yellowish brown silty clay loam; the middle part is yellowish brown, mottled silty clay loam; and the lower part is yellowish brown, mottled silt loam. The underlying material to a depth of 68 inches is light brownish gray and yellowish brown, calcareous silt loam. In a few areas, material from excavations covers the surface layer. In other areas, the surface layer is mixed with cinders, concrete, or brick. In some areas it has been cut, filled, and levelled. In places, the surface layer is thinner than is typical.

Included in mapping this complex are small areas of nearly level, somewhat poorly drained Ipava soils. These included soils make up 5 to 10 percent of the complex.

Water and air move through the Tama soils at a moderate rate. The available water capacity is very high. The organic matter content is high, and the natural fertility is high. The surface layer and the subsoil are slightly acid or neutral. The potential is high for frost action and moderate for shrinking and swelling.

The Tama soils are used for lawns, gardens, parks and other recreation uses, and as building sites. They have good potential for lawns, vegetable and flower gardens, trees, and shrubs. They have fair potential for recreation uses and for building site development.

Tama soils are well suited to grasses, trees, shrubs, flowers, and vegetables. There is a slight hazard of erosion in gardens and newly planted lawns. Water infiltration can be increased and erosion can be reduced if organic material is added to the soil. The surface layer is friable, and seedbeds are easily prepared.

A few small open areas of the Tama soil are available for the development of playgrounds and parks. Sites for playgrounds may need to be levelled by grading. Graded areas should be seeded as soon as possible to establish a vegetative cover.

Sanitary facilities should be connected to public sewers and treatment facilities. Footings and foundations of small buildings need to be designed to withstand the shrinking and swelling of the soil. If Tama soils are used as sites for local roads and streets, suitable base material is needed to increase the strength of the roadbed and to reduce the damage from frost action.

This complex is not assigned to an interpretative grouping.

2043—Urban land-Ipava complex. This complex consists of areas of Urban land and of nearly level, somewhat poorly drained Ipava soil on upland flats in the city of Springfield. Individual areas are irregular in shape and range from 20 to 300 acres in size. This complex is 55 to 80 percent Urban land and 15 to 30 percent Ipava soil. Urban land and the Ipava soil are in areas so intricately mixed or in areas so small, that it was not practical to separate them in mapping.

Urban land is covered by streets, sidewalks, parking lots, dwellings, commercial and industrial buildings, and other structures that obscure or alter the soils to the point that identification is not feasible.

Typically, the surface soil of the Ipava soil is black silt loam 16 inches thick. The subsurface layer is very dark gray silty clay loam 5 inches thick. The subsoil is silty clay loam 30 inches thick. The upper part is brown and mottled. The lower part is grayish brown and mottled and is mixed with yellowish brown in the lower 7 inches. The underlying material to a depth of 63 inches is yellowish brown and light brownish gray, calcareous silt loam. In some areas, the soil has been altered by construction operations. The soil has been covered with material from excavations; in a few small areas it has been cut, built up, or smoothed; and in other areas it has cinders and bricks mixed with the surface layer.

Included in mapping are small areas of poorly drained Sable soils and well drained Tama soils. Sable soils are in small depressions. Tama soils are commonly along small drainageways, but in a few places they are on gently sloping ridges. The included soils make up 5 to 15 percent of the complex.

Water and air move through the Ipava soil at a moderate to moderately slow rate. The available water capacity is very high. The surface layer is slightly acid or medium acid, and the subsoil is medium acid to neutral. The organic matter content and natural fertility are high. Most areas of Urban land are artificially drained by gutters and sewer systems. The Ipava soil, however, is not drained and has a water table within 1 to 3 feet of the surface during the wet season. The frost-action potential and shrink-swell potential are high.

The Ipava soil is used for lawns, gardens, building sites, parks, and open space. It has good potential for lawns and for vegetable and flower gardens and fair potential for trees and shrubs and for recreation uses. It has poor potential for building site development.

The Ipava soil is well suited to grasses, flowers, and vegetables. Excess water slightly restricts the growth of tree roots. Perennial plants should have a tolerance for slight wetness.

The excess water is a moderate to severe limitation for recreation uses. Tile or other methods of artificial drainage can be successfully used on this soil. Onsite investigation should determine the best method of drainage for a particular area.

The Ipava soil has severe limitations for sanitary facilities and building site development. Consequently, sanitary facilities should be connected to public sewers and treatment facilities. Houses and small buildings should be constructed without basements to avoid damage from wetness and the shrinking and swelling of the soil. Roads and streets on this soil need suitable base material to reduce the damage resulting from frost action, shrinking and swelling, and low strength of the soil.

This complex is not assigned to an interpretative grouping.

2068—Urban land-Sable complex. This complex consists of areas of Urban land and of nearly level, poorly drained Sable soil on flat uplands and in shallow depressions. The Sable soil is subject to occasional flooding for brief periods in spring. Individual areas range from 40 to 300 acres in size. This complex is 50 to 80 percent Urban land and 15 to 30 percent Sable soil. Urban land and the Sable soil are in areas so intricately mixed or in areas so small that it was not practical to separate them in mapping.

Urban land is covered with houses, apartments, commercial buildings, streets, sidewalks, parking lots, and other structures that conceal or alter the soils to the point that identification is not possible.

Typically, the surface layer of the Sable soil is black silty clay loam about 19 inches thick. The subsoil is about 23 inches thick. It is dark grayish brown, mottled silty clay loam in the upper part and grayish brown, mottled silt loam in the lower part. The underlying material to a depth of 60 inches is light brownish gray, mottled, calcareous silt loam. In places, this soil has been disturbed by grading and digging; the surface layer and the subsoil have been mixed. In some areas, cinders are mixed with the upper part of the soil. In a few areas, the subsoil is thinner than is typical, and calcareous silt loam is at a depth of 20 inches.

Included in mapping are small areas of Ipava soils. Ipava soils are somewhat poorly drained and they are on slightly higher, better drained positions than the Sable soil. The included soils make up 5 to 10 percent of the complex.

Water and air move through the Sable soil at a moderate rate. The available water capacity is very high. The organic matter content and natural fertility are high. The surface layer is slightly acid to medium acid, and the subsoil is slightly acid to mildly alkaline. During wet seasons, the water table is at the surface of the soil. The frost-action potential is high, and the shrink-swell potential is moderate.

The Sable soil is used mainly for lawns, gardens, and parks. There are a few small open spaces. This soil has good potential for lawns, gardens, trees, and shrubs. It has poor potential for recreation uses and for building site development.

The Sable soil is suited to grasses, flowers, vegetables, trees, and shrubs. Excess water in this soil is difficult to drain. Properly built public sewers can be used to remove surface water. The trees and shrubs planted in this soil should have a high tolerance for wetness.

The Sable soil has severe limitations for recreation uses because of the excess water in the soil and because of flooding. Subsurface tile drains and surface ditches can be used to help drain the excess water from playgrounds. Play areas and walks may need special surfacing. Onsite investigation is needed to properly evaluate and plan the development of specific sites.

The Sable soil has severe limitations for building site development. Most areas of this soil are drained by sewers. Sanitary facilities should be connected to public sewers and treatment facilities. Houses and small buildings should be constructed without basements. Foundations and footings should be designed to withstand the shrinking and swelling of the soil. The Sable soil lacks sufficient strength and stability to support roads and streets. Using suitable base material for roadbeds helps to reduce the damage resulting from frost action in the soil and the low strength of the soil.

This complex is not assigned to an interpretative grouping.

2119D—Urban land-Elco complex, 7 to 15 percent slopes. This complex consists of areas of Urban land and of strongly sloping, moderately well drained Elco soil along drainageways. Individual areas are long and narrow. They range in size from 20 to 250 acres. This complex is 50 to 75 percent Urban land and 20 to 40 percent Elco soil. Urban land and the Elco soil are so closely associated, or are in areas so small, that it was not practical to separate them in mapping.

Urban land is covered with houses, commercial buildings, roads and streets, parking lots, and other structures that obscure or so alter the soil that identification is not possible.

Typically, the surface layer of the Elco soil is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 8 inches thick. The subsoil is more than 58 inches thick. The upper part is yellowish brown silt loam and silty clay loam; the middle part is grayish brown and yellowish brown silty clay loam; and the lower part is gray, mottled loam. In many places, the soil has been altered by construction. Drainageways have been filled with material excavated from basements or cut from other areas to level the surface. Bricks, concrete, or cinders fill a few low areas. In some small areas, slopes range from 7 to 20 percent. In places, the subsoil is more sandy than is typical. In few places, the surface layer is thicker than is typical.

In the Elco soil, permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. Surface runoff is rapid. The available water capacity is high. The organic matter content is moderately low, and natural fertility is medium. The surface layer and the subsoil are slightly acid. A seasonal high water table is about 3 feet below the surface. The potential is high for frost action and moderate for shrinking and swelling.

The Elco soil is used for lawns, gardens, and parks and as building sites and open space. It has good potential for lawns, gardens, trees, and shrubs. It has fair to poor potential for most recreation uses and fair potential for building site development.

The Elco soil is suited to grasses, flowers, vegetables, trees, and shrubs. Erosion is a hazard if the soil is disturbed or left bare. Adding organic material to the soil increases water infiltration and thereby helps to reduce erosion. In places, water can be diverted from those areas where erosion is a hazard.

This soil has moderate limitations for recreation development. Slopes are steep, and open areas of this soil are too small to use for recreation. A few small, less sloping areas are suitable for use as playgrounds.

All sanitary facilities should be connected to public sewers and treatment facilities. The footings and foundations of dwellings and small buildings should be designed to withstand the shrinking and swelling of this soil. The use of suitable base material for local roads and streets can reduce the damage caused by frost action in the soil. Erosion is a hazard in construction areas. Organic material should be applied to the surface of the soil, and a vegetative cover should be established as soon as possible.

This complex is not assigned to an interpretative grouping.

Use and management of the soils

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

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

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

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

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

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

Crops and pasture

Gary L. Wood, district conservationist, Sangamon County Field Office, assisted in writing this section.

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

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

More than 448,000 acres was used for crops and pasture in Sangamon County in 1967 (*7*). Of this, 405,000 acres was used for row crops, mainly corn and soybeans, and 43,000 acres was used for pasture and hay. The acreage in crops and pasture is decreasing as a result of urban development.

Erosion is the major soil problem on about one-fourth of the cropland and one-half of the pastureland where the slope is more than 2 percent. Alvin, Assumption, Broadwell, Elco, Elkhart, Fayette, Middletown, Sylvan, and Tama soils have slopes of 2 to 20 percent.

Erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging to soils that have a subsoil consisting of glacial till; for example, Assumption and Elco soils. Erosion reduces the productivity of soils that contain calcareous loess in the root zone; for example, Elkhart and Sylvan soils. Erosion also reduces the productivity of droughty soils; for example, Alvin loamy sand. Second, soil erosion results in the sedimentation of streams. Controlling erosion minimizes the pollution of streams by sediment, thus improving the quality of water for municipal use, for recreation uses, and for fish and wildlife.

Management practices that provide protective surface cover, reduce runoff, and increase infiltration are needed to control erosion. A cropping system that keeps vegetative cover on the soil for extended periods can limit soil loss by erosion to an amount that will not reduce the productive capacity of the soil. On livestock farms, the legume and grass forage crops in the cropping system reduce erosion on sloping land. They also provide nitrogen and improve tilth for the next crop.

Terraces and diversions reduce the length of the slope and reduce runoff and erosion. They are practical in many areas of the sloping soils that formed in loess. Most of the soils have some slopes that are so short and irregular that terraces are not practical. Wetness is a limitation to the use of terraces on Elco soils.

Conservation tillage and winter cover crops help to increase infiltration and reduce the hazards of runoff and erosion on the sloping soils. No-tillage for corn and soybeans is effective in reducing erosion on sloping soils. Contouring and contour stripcropping are suitable erosion control practices in a few areas of soils that have smooth, uniform slopes. Fayette, Sylvan, and Tama soils are examples.

Soil drainage is the major management need on about one-third of the acreage used for crops and pasture. Some soils are naturally so wet that they must be artificially drained before the crops common to the county can be grown. The very poorly drained Shiloh soils and the poorly drained Cowden, Denny, Edinburg, Harpster, Hartsburg, Sable, Sawmill, Sexton, and Virden soils are examples.

In some years, the somewhat poorly drained soils are so wet that crops are damaged unless the soils are artificially drained. The Elburn, Ipava, Kendall, Keomah, Lawson, Radford, and Tice soils are examples.

The design of surface and subsurface drainage systems varies according to the kind of soil. Tile drainage is effective in most of the soils that are used for crops and pasture. Tile drains have to be more closely spaced in Ipava, Keomah, and Virden soils, which are moderately slowly permeable, than in the more permeable soils. Surface drainage is more effective than tile drainage in the slowly permeable Cowden, Denny, and Sexton soils. A combination of tile drainage and surface drainage is effective in the moderately slowly permeable and slowly permeable Edinburg and Shiloh soils.

Soil fertility is naturally low in Gosport and Hickory soils. It is medium to high in the other soils in the county. Huntsville, Lawson, Radford, Ross, Sawmill, and Tice soils and the other soils on flood plains are slightly acid to mildly alkaline and naturally high in fertility. Camden, Elburn, Kendall, Plano, and Sexton soils, which are on stream terraces, are strongly acid to slightly acid and are lower in fertility than are the soils on flood plains.

Most upland soils are naturally strongly acid to mildly alkaline. Harpster soils are calcareous. The nearly level and poorly drained or somewhat poorly drained soils are generally less acid and have more plant nutrients than the sloping soils. The levels of available phosphorus and potassium are naturally medium to high in most of these soils. For all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected yield.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water. Soils that are granular and porous have good tilth. In this survey area, most of the soils that are used for crops have a silt loam or silty clay loam surface layer that is dark in color and high or moderate in content of organic matter. On soils that have a surface layer of silty clay loam, tilth is a problem because these soils often stay wet until late in spring. If they are wet when plowed, they tend to be cloddy when dry; as a result, a good seedbed is difficult to prepare. Edinburg, Harpster, Hartsburg, Sable, Sawmill, Shiloh, Tice, and Virden soils are examples. Because these soils are nearly level and are not subject to erosion they can be tilled in the fall, and the result is good tilth in the spring.

Some of the soils used for crops have a surface layer of silt loam that is light in color and moderate or moderately low in content of organic matter. Generally, these soils crust after intense rainfall. The crust reduces infiltration and increases runoff, especially on light colored soils that are severely eroded, have a surface layer of silty clay loam, and are low in content of organic matter. Regular additions of crop residue and other organic material can help to improve the structure of the soil and thereby reduce the formation of a crust.

The sloping, light colored Camden, Elco, Fayette, Middletown, Sylvan, and Thebes soils are subject to damaging erosion if they are plowed in the fall. A crust forms on these soils in winter and spring. Nearly level Kendall, Keomah, and Sexton soils are suited to fall plowing if the seedbed is prepared in spring when these soils contain the proper amount of moisture.

Corn and soybeans are the major field crops. Grain sorghum, wheat, oats, and similar crops can be grown if economic conditions are favorable.

Very little acreage is used for vegetables, fruit, nursery plants, and other special crops. Deep soils that have good natural drainage and that warm up early in spring are well suited to these crops. Broadwell, Elkhart, Fayette, Middletown, Sylvan, and Tama soils that have slopes of less than 6 percent are examples. Alvin soils are well suited to melons.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered (*4*).

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

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

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

Land capability classification

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

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

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

Class I soils have slight limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map unit is given in the section "Soil maps for detailed planning."

Woodland management and productivity

When the first settlers arrived in what is now Sangamon County, trees covered only a small part of the area. Since then, the trees have been cleared from most of the land suitable for cultivation. Much of the remaining woodland is on soils that are too steep for farming. These soils have good potential for producing trees of high quality if the woodland is properly managed.

In 1967, woodland covered about 37,000 acres, or 6 percent, of the county (*7*). Most of this woodland was privately owned.

The largest areas of woodland are in map units 4, 5, and 6, described in the section "General soil map for broad land use planning." Mixed hardwoods, mainly white oak, red oak, hickory, elm, and ash are the most common trees on uplands. Soft maple, cottonwood, sycamore, ash, and elm are the most common trees on bottom lands.

Pruning desirable trees and removing undesirable trees can improve most of the existing woodland. The harvesting of mature trees and restocking are needed in a few areas of woodland. Restocking is needed in many areas. Protection from grazing, fire, disease, and insects is also needed to improve the woodland.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil; *c*, clay in the upper part of the soil; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: w, c, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blow down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Windbreaks and environmental plantings

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

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

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

Table 7 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 7 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a nursery.

Recreation

The potential for development of recreation facilities is fair throughout most of the county. Lake Springfield and the Sangamon River are good for fishing, boating, and swimming; and the surrounding areas are good for picnicking, hunting, camping, and hiking. Several hundred acres of Sangchris Lake is in the southeastern part of the county. This state-owned lake is suitable for fishing, boating, and other recreation activities.

In Sangamon County there are many historic sites that attract tourists (*8*). Of special importance are the Lincoln Tomb State Memorial and the Lincoln Home State Memorial in Springfield.

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, availability of potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water.

The soils in Sangamon County support habitat for a variety of wildlife including pheasant, quail, mourning dove, white-tailed deer, squirrel, rabbit, songbirds, fox, raccoon, mink, and muskrat. Snipe, heron, and other shore birds inhabit the bottom lands. The streams and lakes support small mouth bass, catfish, carp, and sunfish. Many farm ponds are stocked with largemouth bass and bluegill. These ponds also provide habitat for migratory ducks in spring and fall.

Most areas in the county can be improved for use as wildlife habitat. The map units described in the section "General soil map for broad land use planning" can be grouped into two wildlife areas:

Wildlife area 1. The soils in map units 1, 2, 3, and 6 make up this wildlife area. These soils are nearly level to strongly sloping and poorly drained to well drained. The soils in map unit 6 are subject to flooding.

This wildlife area consists mainly of cropland, much of which is used continuously for corn and soybeans. Many of the soils are plowed in the fall. This area provides habitat for ring-necked pheasant, raccoon, and deer; nongame species such as the horned lark, dickcissel, meadowlark, grasshopper sparrow, fox, and snake; and other openland wildlife.

The habitat is generally poor in quality because of the lack of crop residue, herbaceous nesting and roosting cover, woody cover, and travel lanes or hedgerows. The wildlife would benefit from delayed mowing of grassy cover on roadsides and ditchbanks and along waterways until after the nesting season; protection of woody cover; and crop residue management.

Wildlife area 2. The soils in map units 4 and 5 make up this wildlife area. These soils are gently sloping to very steep and well drained to moderately well drained.

This wildlife area borders the major streams in the county, and it provides much more diversified habitat than wildlife area 1. It consists of cropland, pasture, and woodland. The major game species are ring-necked pheasant, white-tailed deer, mourning dove, bobwhite quail, fox, squirrel, and rabbit. The nongame species include those that inhabit brushy cover and woodland in addition to those listed in wildlife area 1.

Pasture management, protection of woodlands from livestock, crop residue management, and delayed mowing of grassy cover can benefit wildlife in this area.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and soybeans.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, ragweed, and foxtail.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, ash, cherry, cottonwood, apple, hawthorn, dogwood, hickory, blackberry, and elderberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and dogwood.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology;

(6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building site development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of these materials. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of material that is suitable but less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely.

The ratings in table 12 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in tables 14 and 15.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water management

Table 13 gives information on the soil properties and site features that affect water management. The kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

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

Engineering properties

Table 14 gives estimates of the engineering classification and of the range of properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and chemical properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams and by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Only saturated zones within a depth of about 6 feet are indicated. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering test data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and morphology." The soil samples were tested by the Illinois State Department of Transportation.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M-145-66 (AASHTO); Unified classification—D-2487-66T (ASTM); Mechanical analysis—T88-57 (AASHTO); Liquid limit—T89-60 (AASHTO), D-423 (ASTM); Plasticity index—T90-56 (AASHTO); Moisture density, Method A—T99-57 (AASHTO).

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*9*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 18, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

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

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquoll (*Aqu*, meaning water, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquolls (*Hapl*, meaning minimal horizonation, plus *aquoll*, the suborder of the Mollisols that have an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Haplaquolls.

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

Soil series and morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*6*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*9*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Soil maps for detailed planning."

Alvin series

The Alvin series consists of deep, well drained soils on uplands and high terraces. These soils have a moderately permeable subsoil and rapidly permeable underlying material. They formed in sandy material that was deposited by wind and water. The slope ranges from 4 to 20 percent.

Alvin soils are similar to Thebes soils and are commonly adjacent to Middletown and Thebes soils. Middletown soils formed in 40 to 60 inches of loess and the underlying sand. Thebes soils formed in 20 to 40 inches of loess and the underlying sand.

Typical pedon of Alvin loamy sand, 4 to 7 percent slopes, 1,540 feet east and 210 feet north of the center of sec. 1, T. 16 N., R. 5 W.

A1—0 to 9 inches; dark brown (10YR 4/3) loamy sand; weak fine granular structure; friable; common fine and medium roots; medium acid; clear smooth boundary.

A2—9 to 13 inches; dark brown (10YR 4/3) sandy loam; weak medium platy structure parting to weak fine granular; friable; few fine and medium roots; dark brown (10YR 3/3) coatings on faces of peds; medium acid; clear smooth boundary.

B1t—13 to 18 inches; brown (7.5YR 5/4) sandy loam; weak fine and medium subangular blocky structure; friable; few fine roots; thin dark brown (10YR 3/3) discontinuous clay films on faces of peds; medium acid; clear smooth boundary.

B21t—18 to 22 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few fine roots; thin dark brown (7.5YR 4/4) discontinuous clay films on faces of peds; medium acid; clear smooth boundary.

B22t—22 to 27 inches; strong brown (7.5YR 5/6) light sandy clay loam; moderate medium and coarse subangular blocky structure; firm; few fine roots; thin dark brown (7.5YR 4/4) discontinuous clay films on faces of peds; medium acid; clear smooth boundary.

B23t—27 to 32 inches; strong brown (7.5YR 5/6) sandy loam; weak medium and coarse subangular blocky structure; friable; few fine roots; thin dark brown (7.5YR 4/4) discontinuous clay films on faces of peds; medium acid; clear smooth boundary.

B3t—32 to 41 inches; strong brown (7.5YR 5/6) loamy sand; weak coarse subangular blocky structure; friable; strongly acid; clear smooth boundary.

C—41 to 60 inches; strong brown (7.5YR 5/6) loamy sand and sand; single grained; strongly acid.

The solum is 36 to 70 inches thick.

The A horizon has color value of 4 or 5 and chroma of 2 to 4. It is dominantly loamy sand, but the range includes fine sandy loam or sandy loam. The B2 horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or fine sandy loam but includes thin layers of sandy clay loam. The B horizon, on the average, is 12 to 18 percent clay. Reaction ranges from slightly acid to strongly acid. The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is medium acid or strongly acid.

Assumption series

The Assumption series consists of deep, moderately well drained soils on loess-covered uplands. These soils are moderately permeable in the upper part of the profile and moderately slowly permeable in the lower part. They formed in loess and in the underlying buried soil, which formed in Illinoian till. The slope ranges from 4 to 15 percent.

Assumption soils are similar to Tama soils, and they are commonly adjacent to Elkhart and Tama soils. Tama and Elkhart soils formed in calcareous loess, and they do not have a paleosol.

Typical pedon, in an uneroded area, of Assumption silt loam, 7 to 15 percent slopes, eroded, 102 feet north and 57 feet east of the SW corner of sec. 32, T. 15 N., R. 6 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many roots; medium acid; abrupt smooth boundary.

A12—7 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few light gray (10YR 7/1) dry silt coats; few splotches of dark yellowish brown (10YR 4/4); common roots; medium acid; clear smooth boundary.

B1t—12 to 16 inches; dark yellowish brown (10YR 4/4) silt loam; moderate very fine subangular blocky structure; friable; few light gray (10YR 7/1) dry silt coats and thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; common roots; medium acid; clear smooth boundary.

B21t—16 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine subangular blocky structure; firm; thin discontinuous dark yellowish brown (10YR 3/4) clay films on faces of peds; common roots; medium acid; clear smooth boundary.

B22t—23 to 30 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; thin discontinuous dark yellowish brown (10YR 3/4) clay films on faces of peds; common roots; few sand grains; medium acid; clear smooth boundary.

IIB23tb—30 to 38 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; thin discontinuous brown or dark brown (10YR 4/3) clay films on faces of peds; few sand grains; few roots; few fine black (5YR 2/1) concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

IIB24tgb—38 to 62 inches; gray (5YR 5/1) clay loam; common distinct yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; firm; few roots; many sand grains and few glacial pebbles; slightly acid.

The solum is more than 60 inches thick. The lower part of the solum formed in a paleosol.

The A horizon has color value of 3 or 2 and chroma of 2 or 3. The B horizon, which formed in loess, has color value of 4 or 5 and chroma of 3 or 4. It is dominantly silty clay loam, but the range includes silt loam. The IIB horizon has color value of 4 to 6 and chroma of 1 to 4; the grayer colors are in the lower part. Texture is silty clay loam or clay loam. Reaction ranges from neutral to medium acid in the IIB horizon.

Broadwell series

The Broadwell series consists of deep, well drained soils on loess-covered uplands. These soils formed in 40 to 60 inches of loess and the underlying loamy sand or sand. The soil material that formed in loess is moderately permeable, and the soil material that formed in the underlying loamy sand or sand is rapidly permeable. The slope ranges from 2 to 7 percent.

Broadwell soils are similar to Middletown soils; and they are commonly adjacent to Alvin, Middletown, and Thebes soils. Alvin soils have a coarse-textured B2t horizon and typically have steeper slopes than Broadwell soils. Middletown soils do not have a mollic epipedon. Thebes soils have steeper slopes than Broadwell soils, and they contain loamy sand and silt loam below a depth of 20 to 40 inches.

Typical pedon of Broadwell silt loam, 2 to 4 percent slopes, 136 feet south and 254 feet west of the NE corner of sec. 20, T. 15 N., R. 3 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; friable; few roots; slightly acid; abrupt smooth boundary.

A12—8 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; neutral; clear smooth boundary.

B1—14 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; thin dark brown (10YR 3/3) continuous coatings on faces of peds; weak fine subangular blocky structure; friable; neutral; clear smooth boundary.

B21t—21 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; thin dark brown (10YR 3/3) continuous coatings on faces of peds; moderate medium subangular blocky structure; friable; medium acid; gradual smooth boundary.

B22t—26 to 38 inches; dark yellowish brown (10YR 4/4) silty clay loam; thin dark brown (10YR 3/3) discontinuous coatings on faces of peds; few fine faint yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; medium acid; gradual smooth boundary.

B31t—38 to 55 inches; dark yellowish brown (10YR 4/4) silty clay loam; thin dark brown (10YR 3/3) discontinuous coatings on faces of peds; few fine distinct yellowish brown (10YR 5/6) and light gray (10YR 7/2) mottles; few fine dark concretions; weak medium subangular blocky structure; friable; medium acid; clear smooth boundary.

IIB32—55 to 60 inches; dark yellowish brown (10YR 4/4) loamy sand; thin dark brown (10YR 3/3) discontinuous coatings on faces of peds; common fine distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; friable; medium acid.

The solum is 50 to 60 inches thick. The mollic epipedon is 11 to 16 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon is dominantly silty clay loam, but the range includes loamy fine sand and loamy sand in the lower part. The B horizon, on the average, is 28 to 35 percent clay. It ranges from neutral to medium acid. The C horizon, if present, has hue of 7.5YR or 10YR. It is loamy fine sand or fine sand. It is strongly acid to slightly acid.

Camden series

The Camden series consists of deep, well drained, moderately permeable soils on loess-covered stream terraces. These soils formed in 24 to 36 inches of loess or silty material and in the underlying loamy outwash. The slope ranges from 0 to 12 percent.

Camden soils are commonly adjacent to Kendall and Sexton soils. Kendall soils formed in 40 to 60 inches of loess and loamy outwash and are nearly level and gently sloping. Sexton soils have more clay in the B2t horizon than Camden soils and are in shallow depressions.

Typical pedon of Camden silt loam, 0 to 2 percent slopes, 760 feet east and 450 feet north of the center of sec. 4, T. 15 N., R. 4 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; very dark grayish brown (10YR 3/2) coatings on faces of peds; slightly acid; abrupt smooth boundary.

A2—7 to 13 inches; dark brown or brown (10YR 4/3) silt loam; moderate medium platy structure; friable; very dark grayish brown (10YR 3/2) coatings on faces of peds; medium acid; clear smooth boundary.

B1t—13 to 18 inches; dark brown or brown (10YR 4/3) light silty clay loam; weak and moderate fine subangular and angular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—18 to 27 inches; dark yellowish brown (10YR 4/4) silty clay loam; medium subangular and angular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B23t—27 to 36 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; noticeable very fine sand; medium acid; clear smooth boundary.

IIB24t—36 to 41 inches; dark yellowish brown (10YR 4/4) clay loam; moderate coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB3t—41 to 53 inches; dark yellowish brown (10YR 4/4) light clay loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; slightly acid; gradual smooth boundary.

IIC—53 to 60 inches; dark yellowish brown (10YR 4/4) loam; massive; friable; slightly acid.

The solum is 40 to more than 60 inches thick. The Ap and A2 horizons are 12 to 16 inches thick.

The A2 horizon has color value of 4 or 5 and chroma of 3 or 4. The B horizon has value of 4 to 6 and chroma of 3 to 5. It is strongly acid to slightly acid. The IIB horizon is clay loam or sandy loam. The C horizon is loam or sandy loam and has thin layers of silt loam and loamy sand. It is medium acid or slightly acid.

Cowden series

The Cowden series consists of deep, poorly drained, slowly permeable soils on loess-covered uplands. These soils formed in loess. The slope ranges from 0 to 2 percent.

These soils are a taxadjunct to the Cowden series because there is no abrupt textural change between the albic and the argillic horizons. This difference does not alter the use or behavior of these soils.

Cowden soils are similar to Denny soils and are commonly adjacent to Ipava and Virden soils. Denny soils are less acid in the upper part of the B horizon than Cowden soils. Ipava and Virden soils have a mollic epipedon and do not have an A2 horizon.

Typical pedon of Cowden silt loam, 1,443 feet north and 1,323 feet west of SE corner of sec. 36, T. 13 N., R. 5 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few roots; neutral; abrupt smooth boundary.

A21—8 to 13 inches; dark gray (10YR 4/1) silt loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak fine platy structure parting to moderate fine granular; friable; few roots; dark gray (10YR 3/1) coatings on faces of peds; medium acid; clear smooth boundary.

A22—13 to 18 inches; grayish brown (10YR 5/2) silt loam; few fine faint dark yellowish brown (10YR 4/4) mottles; weak fine platy structure parting to moderate fine granular; friable; few roots; strongly acid; abrupt smooth boundary.

B21t—18 to 26 inches; dark grayish brown (10YR 4/2) heavy silty clay loam; common fine distinct yellowish brown (10YR 5/6), few fine faint dark brown (10YR 3/3), and few fine distinct black (10YR 2/1) mottles; strong medium subangular blocky structure; firm; few roots; thick dark gray (10YR 4/1) continuous films on faces of peds; strongly acid; clear smooth boundary.

B22t—26 to 36 inches; grayish brown (10YR 5/2) heavy silty clay loam; many medium distinct yellowish brown (10YR 5/4 and 5/6) and common medium faint light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few roots; very dark gray (10YR 3/1) and dark gray (10YR 4/1) coatings on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B23t—36 to 44 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6 and 5/8) and few fine distinct very dark gray (10YR 3/1) mottles; moderate coarse subangular blocky structure; firm; few roots; thin dark gray (10YR 4/1) discontinuous clay films on faces of peds; very dark gray (10YR 3/1) channel fillings; slightly acid; gradual smooth boundary.

B3t—44 to 50 inches; grayish brown (10YR 5/2) light silty clay loam; common medium distinct yellow (10YR 7/6), few fine faint brown (10YR 5/3), and few fine distinct dark yellowish brown (10YR 3/4) mottles; weak coarse subangular blocky structure; firm; thin dark gray (10YR 4/1) discontinuous clay films on faces of peds; dark gray (10YR 4/1) channel fillings; neutral; gradual boundary.

C1—50 to 58 inches; grayish brown (10YR 5/2) heavy silt loam; few fine distinct dark yellowish brown (10YR 3/4) mottles; massive; friable; dark gray (N 4/0) and very dark gray (N 3/0) channel fillings; slightly acid; gradual smooth boundary.

C2—58 to 68 inches; light brownish gray (10YR 6/2) silt loam; many coarse distinct strong brown (7.5YR 5/6) and few fine faint dark yellowish brown (10YR 3/4) mottles; massive; friable; dark gray (10YR 4/1) and very dark gray (10YR 3/1) channel fillings; neutral.

The solum is 45 to 60 inches thick. The Ap horizon is 6 to 10 inches thick.

The Ap horizon has chroma of 1 or 2. The B horizon in most pedons has hue of 10YR throughout; but in some pedons there is a B3 horizon that has hue of 5Y. The B horizon has color value of 4 to 6 and chroma of 1 or 2. In most pedons it is silty clay loam throughout, but in some pedons there is a B3 horizon of silt loam. The argillic horizon, on the average, is 35 to 40 percent clay in the upper 20 inches. Reaction ranges from very strongly acid to slightly acid in the B2 horizon and from slightly acid to neutral in the B3 horizon. The C horizon has hue of 10YR or 5Y, value of 5 or 6, and chroma of 1 to 6. Reaction ranges from slightly acid to moderately alkaline.

Denny series

The Denny series consists of deep, poorly drained, slowly permeable soils in depressions on loess-covered uplands. These soils formed in loess. The slope ranges from 0 to 2 percent.

Denny soils are similar to Cowden soils and are commonly adjacent to Ipava and Sable soils. Cowden soils are more acid in the upper part of the B horizon. Ipava soils have a mollic epipedon 14 to 24 inches thick. Sable soils have a mollic epipedon 14 to 23 inches thick.

Typical pedon of Denny silt loam, 300 feet north and 99 feet west from the center of sec. 25, T. 17 N., R. 4 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

A2—8 to 16 inches; gray (10YR 5/1) silt loam; weak fine platy structure parting to moderate fine and medium granular; friable; very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) coatings on faces of peds; common fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

B21tg—16 to 20 inches; dark grayish brown (10YR 4/2) heavy silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular and angular blocky structure; firm; thick gray (10YR 5/1) and dark gray (10YR 4/1) continuous clay films on faces of peds; medium acid; clear smooth boundary.

B22tg—20 to 27 inches; grayish brown (10YR 5/1) light silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; strong medium angular blocky structure; firm; thick gray (10YR 5/1) and dark gray (10YR 4/1) continuous clay films on faces of peds; medium acid; gradual smooth boundary.

B23tg—27 to 40 inches; grayish brown (2.5Y 5/2) light silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to strong coarse angular blocky; firm; thick gray (10YR 5/1) and dark gray (10YR 4/1) continuous clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; gradual smooth boundary.

B24tg—40 to 50 inches; grayish brown (2.5Y 5/2) heavy silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; thin gray (10YR 5/1) and dark gray (10YR 4/1) discontinuous clay films on faces of peds; slightly acid; gradual smooth boundary.

B3tg—50 to 56 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak and moderate coarse prismatic structure; firm; thin dark gray (10YR 4/1) discontinuous clay films on faces of peds; few fine dark concretions (iron and manganese oxides); slightly acid; gradual smooth boundary.

C—56 to 65 inches; mixed light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt loam; massive; friable; dark gray (10YR 4/1) fillings in root channels; neutral.

The solum is 48 to 60 inches thick. The Ap horizon is 6 to 9 inches thick.

The Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The A2 horizon has value of 4 or 5 and chroma of 1 or 2. The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is 35 to 40 percent clay. Reaction ranges from medium acid to slightly acid in the B2 horizon.

Edinburg series

The Edinburg series consists of deep, poorly drained, moderately slowly permeable and slowly permeable soils on loess-covered uplands. These soils formed in loess. The slope ranges from 0 to 1 percent.

Edinburg soils are similar to Virden soils and are adjacent to Ipava, Sable, and Virden soils. Ipava soils are somewhat poorly drained and are slightly higher on the landscape than Edinburg soils. Sable soils have less clay in the B horizon. Virden soils have more organic matter in the A horizon and have the highest percentage of clay in the upper part of the B horizon.

Typical pedon of Edinburg silty clay loam, 276 feet east and 1,200 feet south of the center of sec. 22, T. 14 N., R. 6 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) light silty clay loam, gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; common fine and very fine roots; neutral; abrupt smooth boundary.

A12—8 to 10 inches; very dark gray (10YR 3/1) light silty clay loam, gray (10YR 5/1) dry; moderate medium granular structure with some moderate very fine subangular blocky; firm; common fine and very fine roots; neutral; clear smooth boundary.

A3—10 to 16 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; few fine faint very dark grayish brown (2.5YR 3/2) and few fine distinct olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2) mottles; weak and moderate fine subangular blocky structure; firm; common very fine and few fine roots; few fine yellowish brown (10YR 5/8) concretions; neutral; clear smooth boundary.

B21t—16 to 20 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct olive brown (2.5Y 4/4) mottles; moderate fine angular blocky structure; firm;

few very fine roots; thick continuous very dark gray (10YR 3/1) clay films on faces of peds; few iron and manganese concretions; neutral; gradual smooth boundary.

B22t—20 to 26 inches; dark gray (10YR 4/1) silty clay; few fine distinct olive brown (2.5Y 4/4) mottles; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; firm; few very fine roots; thin continuous dark gray (10YR 4/1) clay films on faces of peds; many small iron and manganese concretions and few concretions as large as 5 millimeters in diameter; slightly acid; gradual smooth boundary.

B23t—26 to 34 inches; dark gray (10YR 4/1) silty clay loam; common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure parting to moderate coarse angular blocky; firm; few very fine roots; thin continuous dark gray (10YR 4/1) clay films and few very dark gray (10YR 3/1) organic coatings on faces of peds; few small iron and manganese concretions and some concretions as large as 5 millimeters in diameter; neutral; gradual smooth boundary.

B24t—34 to 41 inches; mixed yellowish brown (10YR 5/6) and olive gray (5Y 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate coarse angular blocky; firm; few very fine roots; thin discontinuous dark gray (10YR 4/1) clay films and some very dark gray (10YR 3/1) coatings on vertical faces of peds; few iron and manganese concretions; neutral; gradual smooth boundary.

B3—41 to 55 inches; mixed yellowish brown (10YR 5/6) and olive gray (5Y 5/2) light silty clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to weak coarse angular blocky; friable; thin discontinuous dark gray (10YR 4/1) clay films and few very dark gray (10YR 3/1) coatings on vertical faces of peds; few iron and manganese concretions; neutral; gradual smooth boundary.

C—55 to 60 inches; mixed yellowish brown (10YR 5/6) and light olive gray (5Y 6/2) silt loam; massive; friable; dark gray (10YR 4/1) linings in channels; neutral.

The solum is 45 to 65 inches thick. The mollic epipedon is 11 to 23 inches thick.

The Ap and A1 horizons have color value of 3 or 2 and chroma of 1 or 2. The A12 and A3 horizons are dominantly silty clay loam, but in some pedons they are silt loam. The B2t horizon has hue of 10YR, 5Y, or 2.5Y; value of 3 to 6; and chroma of 1 or 2; mottles have chroma of 3 to 6. It averages between 35 and 42 percent clay. Some subhorizons are silty clay and contain as much as 16 percent clay. Reaction is slightly acid or neutral. The C horizon is neutral or mildly alkaline.

Elburn series

The Elburn series consists of deep, somewhat poorly drained, moderately permeable soils on loess-covered stream terraces. These soils formed in 40 to 60 inches of loess or silty material and the underlying stratified loamy outwash. The slope ranges from 0 to 3 percent.

Elburn soils are commonly adjacent to Camden, Kendall, Plano, and Sexton soils. Camden, Kendall, and Sexton soils do not have a mollic epipedon. Camden soils are well drained, and Sexton soils have more clay in the B horizon than Elburn soils. Plano soils are well drained.

Typical pedon of Elburn silt loam, 300 feet north and 1,800 feet east of the SW corner of sec. 20, T. 15 N., R. 4 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; some light brownish gray (10YR 6/2) clean sand grains; common fine roots; medium acid; clear smooth boundary.

A12—9 to 15 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; few fine roots; medium acid; clear smooth boundary.

B1t—15 to 19 inches; dark brown (10YR 4/3) light silty clay loam; few fine faint grayish brown (10YR 5/2), few fine distinct yellowish brown (10YR 5/4), and few fine distinct very dark gray (10YR 3/1) mottles; moderate fine subangular blocky structure; firm; thin continuous very dark gray (10YR 3/1) clay films on faces of peds; few fine roots; medium acid; clear smooth boundary.

B21t—19 to 26 inches; brown (10YR 5/3) silty clay loam; few fine faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/4 and 5/6) and very dark gray (10YR 3/1) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few fine roots; medium acid; clear smooth boundary.

B22t—26 to 37 inches; brown (10YR 5/3) silty clay loam; common fine distinct light gray (10YR 7/1) and light brownish gray (10YR 6/2), common medium distinct brownish yellow (10YR 6/6), and few fine prominent very dark gray (10YR 3/1) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; few fine roots; medium acid; gradual smooth boundary.

B23t—37 to 46 inches; grayish brown (10YR 5/2) silty clay loam; common fine faint light brownish gray (10YR 6/2), common fine and medium distinct brownish yellow (10YR 6/6) and dark yellowish brown (10YR 4/4), and few fine prominent very dark gray (10YR 3/1) mottles; moderate coarse prismatic structure; firm; few dark grayish brown (10YR 4/2) channel fillings; few fine roots; medium acid; gradual smooth boundary.

B31t—46 to 53 inches; mixed grayish brown (10YR 5/2) and brownish yellow (10YR 6/6) light silty clay loam; few fine distinct dark yellowish brown (10YR 4/4) and few fine prominent very dark gray (10YR 3/1) mottles; weak coarse prismatic structure; slightly firm; few dark grayish brown (10YR 4/2) channel fillings and linings; very few fine roots; medium acid; gradual smooth boundary.

IIB32—53 to 60 inches; mixed dark yellowish brown (10YR 4/4), grayish brown (10YR 5/2), and brownish yellow (10YR 6/6) stratified loam, sandy loam, and clay loam; few fine prominent very dark gray (10YR 3/1) mottles; weak coarse prismatic structure; friable; few dark gray (10YR 4/1) channel linings and fillings; slightly acid.

The solum is 50 to 65 inches thick. The mollic epipedon is 14 to 18 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has color value of 4 to 6 and chroma of 2 to 6. If present, the IIC horizon is stratified loamy outwash. Reaction of the IIC horizon ranges from slightly acid to mildly alkaline.

Elco series

The Elco series consists of deep, moderately well drained soils on loess-covered uplands. These soils are moderately permeable in the upper part of the solum and moderately slowly permeable in the lower part. They formed in 20 to 40 inches of loess, and the underlying paleosol formed in Illinoian till. The slope ranges from 7 to 18 percent.

Elco soils are similar to Fayette soils and are commonly adjacent to Fayette, Hickory, and Keomah soils. Fayette soils formed entirely in loess; they do not have an underlying paleosol. Hickory soils have more sand throughout the B horizon than the Elco soils, and they are below the Elco soils on the landscape. Keomah soils have more clay throughout the B horizon and are nearly level.

Typical pedon of Elco silt loam, 7 to 15 percent slopes, 410 feet west and 400 feet north of the center of sec. 35, T. 15 N., R. 4 W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; strong very fine granular structure; friable; many roots; slightly acid; clear smooth boundary.

A2—4 to 12 inches; brown (10YR 4/3) silt loam; weak thin platy structure parting to moderate very fine granular; friable; light gray (10YR 7/1) uncoated silt grains and few very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B1—12 to 15 inches; yellowish brown (10YR 5/4) silt loam; moderate very fine and fine subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) organic coatings on faces of peds; few light gray (10YR 7/1), dry, uncoated silt grains; few small dark concretions; slightly acid; clear smooth boundary.

B21t—15 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; thin continuous brown (10YR 4/3) clay films on faces of peds; few light gray (10YR 7/1) uncoated silt grains; few small black concretions; slightly acid; clear smooth boundary.

IIB22tb—26 to 39 inches; mixed grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) silty clay loam; few fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium and coarse subangular and angular blocky structure; firm; thin discontinuous olive brown (2.5Y 4/4) and dark yellowish brown (10YR 4/4) clay films on faces of peds; common small black concretions; slightly acid; gradual smooth boundary.

IIB23tb—39 to 55 inches; mixed grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate coarse subangular and angular blocky; firm; thin discontinuous olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2) clay films on faces of peds; few small pebbles and many sand grains; few small black concretions; slightly acid; clear smooth boundary.

IIB24tgb—55 to 70 inches; gray (5Y 5/1) loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate medium and fine subangular and angular blocky structure; friable in the upper part and firm in the lower part; thin discontinuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; many sand grains and small pebbles; slightly acid.

The solum is 4 to more than 7 feet thick, depending on the degree of truncation of the paleosol before loess deposition. The A horizon is 3 to 15 inches thick.

The Ap horizon, if present, and the A1 horizon have color value of 3 or 4 and chroma of 2 to 4. Texture is silt loam or silty clay loam. The B1 and B2 horizons have hue of 10YR or 7.5YR and value of 4 or 5. Texture is silt loam or silty clay loam. Reaction in the B1 and B2 horizons ranges from strongly acid to neutral. The IIB horizon has hue of 10YR, 2.5Y, and 5Y; value of 4 or 5; and chroma of 1 or 2. Texture is silty clay loam, clay loam, and loam; some subhorizons in the lower part are silty clay. Reaction ranges from medium acid to neutral.

Elkhart series

The Elkhart series consists of deep, well drained, moderately permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 4 to 15 percent.

Elkhart soils are similar to Tama soils and are adjacent to Assumption, Ipava, and Tama soils. Assumption soils have a solum that formed in loess and till, and they do not have a C horizon. Ipava soils have more clay in the B horizon than Elkhart soils, and they are nearly level. Tama soils have a thicker solum and do not have free carbonates within a depth of 40 inches.

Typical pedon of Elkhart silt loam, 4 to 7 percent slopes, 980 feet east and 1,530 feet south of the northwest corner of sec. 24, T. 17 N., R. 5 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few roots; slightly acid; abrupt smooth boundary.

A3—9 to 14 inches; dark brown (10YR 3/3) heavy silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; few roots; thick continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B1t—14 to 18 inches; dark brown (10YR 4/3) light silty clay loam; moderate fine subangular blocky structure; friable; few roots; thick continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B2t—18 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine and medium subangular blocky structure; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B3t—23 to 29 inches; yellowish brown (10YR 5/4) heavy silt loam; weak fine and medium prismatic structure; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; neutral; clear smooth boundary.

C1—29 to 41 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct gray (10YR 6/1) and few fine distinct yellowish brown (10YR 5/6) and very dark grayish brown (10YR 3/2) mottles; massive; strong effervescence; moderately alkaline; gradual smooth boundary.

C2—41 to 60 inches; mixed light gray (10YR 7/1) and yellowish brown (10YR 5/4) silt loam; few fine distinct very dark grayish brown (10YR 3/2) mottles; massive; strong effervescence; moderately alkaline.

The solum is 22 to 35 inches thick. The depth to carbonates is 22 to 35 inches. The mollic epipedon is 10 to 16 inches thick.

The A horizon has chroma of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. The B horizon is medium acid to mildly alkaline.

Fayette series

The Fayette series consists of deep, well drained, moderately permeable soils on loess-covered uplands. These soils formed in loess. The slope ranges from 2 to 15 percent.

Fayette soils are similar to Elco soils. They are adjacent to Elco, Hickory, Keomah, Sylvan, and Tama soils. Elco soils formed in loess and till and have a paleosol within a depth of 20 to 40 inches. Hickory soils have more sand throughout the B horizon and are below Fayette soils on the landscape. Keomah soils are fine textured and are nearly level. Sylvan soils have a thinner solum, and they have free carbonates at a depth of 20 to 40 inches. Tama soils have a mollic epipedon.

Typical pedon of Fayette silt loam, 2 to 4 percent slopes, 320 feet east and 1,520 feet north of the SW corner of sec. 5, T. 14 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine and fine granular structure; friable; strongly acid; abrupt smooth boundary.

A2—8 to 11 inches; brown (10YR 4/3) silt loam; weak coarse platy structure parting to moderate medium granular; friable; common light gray (10YR 7/1) uncoated silt grains; strongly acid; clear smooth boundary.

B1t—11 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; thin continuous brown (10YR 4/3) clay films on faces of peds; common light gray (10YR 7/1) uncoated silt grains; few black concretions; very strongly acid; clear smooth boundary.

B21t—15 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular and angular blocky structure; firm; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; common light gray (10YR 7/1) uncoated silt grains; few black concretions; very strongly acid; clear smooth boundary.

B22t—23 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and pale olive (5Y 6/4) mottles; moderate medium subangular and angular blocky structure; firm; thin continuous dark brown (10YR 3/3) clay films on faces of peds; few black concretions; strongly acid; clear smooth boundary.

B23t—31 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B31t—40 to 53 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct pale olive (5Y 6/4) and common coarse distinct yellowish brown (10YR 5/6) mottles; weak and moderate coarse subangular blocky structure; firm; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; few black concretions; strongly acid; clear smooth boundary.

B32t—53 to 60 inches; yellowish brown (10YR 5/4) heavy silt loam; many coarse distinct grayish brown

(2.5Y 5/2), common fine distinct strong brown (7.5YR 5/6), and few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

C—60 to 70 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct strong brown (7.5YR 5/6) and few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; medium acid.

The solum is 40 to 65 inches thick. The A horizon is 8 to 14 inches thick.

The A2 horizon has color value of 4 or 5 and chroma of 3 or 4. The B horizon has value of 4 or 5 and chroma of 4 to 6. It is very strongly acid to neutral. The C horizon is medium acid to mildly alkaline.

Gosport series

The Gosport series consists of moderately deep, well drained, very slowly permeable soils on uplands. These soils formed in material that weathered from shale bedrock. The slope ranges from 18 to 50 percent.

These soils are a taxadjunct to the Gosport series because they are less acid than is defined in the range for the series. This difference does not alter the use and behavior of the soils.

Gosport soils are commonly adjacent to Elco, Fayette, and Hickory soils. Elco, Fayette, and Hickory soils have less clay throughout the B horizon and are above Gosport soils on the landscape.

Typical pedon of Gosport silt loam, 18 to 50 percent slopes, 1,500 feet south and 390 feet east of the NW corner of sec. 4, T. 16 N., R. 5 W.

A1—0 to 3 inches; very dark gray (10YR 3/1) silt loam; weak very fine and fine granular structure; friable; strongly acid; clear smooth boundary.

A2—3 to 7 inches; yellowish brown (10YR 5/4) silt loam; weak very fine and fine granular structure; friable; very dark gray (10YR 3/1) and dark brown (10YR 3/3) channel fillings; very strongly acid; clear smooth boundary.

IIB1—7 to 13 inches; light olive brown (2.5Y 5/4) silt loam; weak very fine and fine subangular blocky structure; friable; few yellowish red and strong brown shale fragments easily crushed; medium acid; clear smooth boundary.

IIB21—13 to 17 inches; light olive brown (2.5Y 5/4) light silty clay loam; weak fine subangular blocky structure; friable; few reddish brown shale fragments; medium acid; abrupt smooth boundary.

IIB22—17 to 30 inches; light olive brown (2.5Y 5/4) heavy silty clay loam; weak fine subangular blocky structure; friable; common (5 to 10 percent, by volume) brown (7.5YR 5/4) and light olive brown (2.5Y 5/4) shale fragments; medium acid.

IICr—30 to 45 inches; rippable; brown (7.5YR 5/4) and light olive brown (2.5Y 5/4) shale bedrock.

The solum is 25 to 36 inches thick. The A horizon is 6 to 12 inches thick.

The A1 horizon has color value of 3 or 4 and chroma of 1 or 2. It is silt loam or loam. The A2 horizon has value of 4 or 5 and chroma of 2 to 4. It is silt loam or loam. The B horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is dominantly silty clay loam, but in some pedons, subhorizons in the lower part are silty clay or clay. The B horizon is 36 to 45 percent clay. Reaction ranges from very strongly acid to neutral. Some pedons have a C horizon.

Harpster series

The Harpster series consists of deep, poorly drained, moderately permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 2 percent.

Harpster soils are commonly adjacent to Hartsburg, Ipava, Sable, and Virden soils. Hartsburg soils do not have a calcic horizon and free carbonates within a depth of 20 inches. Ipava soils have more clay throughout the B horizon and are in higher lying areas. Sable soils do not have a calcic horizon and free carbonates within a depth of 40 inches. Virden soils have more clay throughout the B horizon.

Typical pedon of Harpster silty clay loam, 234 feet west and 1,380 feet north of the center of sec. 22, T. 17 N., R. 3 W.

Apca—0 to 9 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak and moderate fine granular structure; friable; shell fragments; violent effervescence (20 percent calcium carbonate); moderately alkaline; abrupt smooth boundary.

A12ca—9 to 18 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine subangular blocky structure; friable; shell fragments; violent effervescence (23 percent calcium carbonate); moderately alkaline; clear smooth boundary.

A3ca—18 to 22 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate very fine and fine subangular blocky structure; firm; shell fragments; violent effervescence (26 percent calcium carbonate); moderately alkaline; clear smooth boundary.

B21g—22 to 26 inches; dark gray (10YR 4/1) silty clay loam; moderate very fine and fine subangular blocky structure; firm; very dark gray (10YR 3/1) and black (10YR 2/1) organic coatings on faces of peds; strong effervescence (13 percent calcium carbonate); mildly alkaline; clear smooth boundary.

B22g—26 to 32 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent light olive brown

(2.5Y 5/6) mottles; moderate fine subangular blocky structure; firm; thin discontinuous dark gray (5Y 5/1) clay films on faces of peds; few dark concretions (iron and manganese oxides); strong effervescence (16 percent calcium carbonate); mildly alkaline; clear smooth boundary.

B23g—32 to 38 inches; gray (5Y 6/1) silty clay loam; many medium prominent light olive brown (2.5Y 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few lime concretions; strong effervescence (22 percent calcium carbonate); mildly alkaline; clear smooth boundary.

B3gca—38 to 44 inches; gray (5Y 6/1) light silty clay loam; common fine distinct olive (5Y 5/4) mottles; weak moderate subangular blocky structure; firm; common lime concretions; few small dark concretions (iron and manganese oxides); violent effervescence (20 percent calcium carbonate); moderately alkaline; clear smooth boundary.

Cgca—44 to 60 inches; gray (5Y 6/1) silt loam; many coarse prominent strong brown (7.5YR 5/8) mottles; massive; friable; violent effervescence (20 percent calcium carbonate); moderately alkaline.

The solum is 35 to 45 inches thick. A calcic horizon is typically at the surface or within a depth of 10 inches, and it has a calcium carbonate equivalent of 15 to 26 percent. The mollic epipedon is 16 to 24 inches thick.

The A horizon has color value of 2 or 3. The Bg horizon has hue of 10YR or 5Y, value of 4 to 6, and chroma of 1 or 2.

Hartsburg series

The Hartsburg series consists of deep, poorly drained, moderately permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 2 percent.

Hartsburg soils are similar to Sable soils and are adjacent to Harpster, Ipava, Sable, and Virden soils. Harpster soils have a calcic horizon. Ipava and Virden soils have more clay throughout the B horizon. The Ipava soils are in higher lying areas. Sable soils do not have free carbonates within a depth of 40 inches.

Typical pedon of Hartsburg silty clay loam, 82 feet north and 1,293 feet east of the SW corner of sec. 14, T. 16 N., R. 8 W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam; dark gray (10YR 4/1) dry; weak medium granular structure; firm; medium acid; abrupt smooth boundary.

A12—7 to 13 inches; black (10YR 2/4) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; firm; neutral; clear smooth boundary.

B21g—13 to 18 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine faint dark grayish brown (2.5Y 3/2) mottles; moderate and strong fine subangular blocky structure; firm; black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.

B22g—18 to 23 inches; dark grayish brown (2.5Y 4/2) silty clay loam; many fine distinct olive brown (2.5Y 4/2) and few fine distinct light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure parting to moderate and strong fine and medium angular and subangular blocky; firm; very dark gray (10YR 3/1) organic coatings on faces of peds; few small dark concretions (iron and manganese oxides); few small lime concretions; mildly alkaline; clear smooth boundary.

B31g—23 to 32 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine distinct olive brown (2.5Y 4/4) and few medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine angular and subangular blocky; firm; thin continuous dark gray (10YR 4/1) clay films on faces of peds; few small dark concretions (iron and manganese oxides); common small lime concretions; strong effervescence; mildly alkaline; clear smooth boundary.

B32g—32 to 39 inches; light brownish gray (2.5Y 6/2) silt loam; common fine distinct light olive brown (2.5Y 5/4 and 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; weak medium subangular and angular blocky structure; friable; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; few small dark concretions (iron and manganese oxides); many small and medium lime concretions; strong effervescence; mildly alkaline; clear smooth boundary.

C1g—39 to 47 inches; light brownish gray (2.5Y 6/2) silt loam; common fine distinct light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6) mottles; weak medium and coarse subangular and angular blocky structure; friable; few small dark concretions (iron and manganese oxides); many small and large lime concretions; strong effervescence; mildly alkaline; clear smooth boundary.

C2—47 to 66 inches; mixed light olive brown (2.5Y 5/4) and light gray (2.5Y 7/2) silt loam, common medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; few small iron and manganese concretions and many small and large calcium carbonate concretions; strong effervescence; mildly alkaline.

The solum is 30 to 42 inches thick. The depth to carbonates is 18 to 35 inches. The mollic epipedon is 14 to 20 inches thick.

The A horizon has color value of 2 or 3. The Bg horizon has hue of 10YR, 5Y, or 2.5Y. A few subhorizons have mottles with chroma of 4 to 8.

Hickory series

The Hickory series consists of deep, well drained, moderately permeable soils on uplands on the Illinoian till plain. In most places these soils formed entirely in Illinoian glacial till; in some places the soil material in the upper 20 inches formed in loess. The slope ranges from 7 to 50 percent.

Hickory soils are commonly adjacent to Elco, Fayette, Gosport, and Sylvan soils. Elco, Fayette, and Sylvan soils have less sand throughout the B horizon and are above the Hickory soils on the landscape. Sylvan soils have free carbonates within a depth of 22 to 35 inches. Gosport soils have more clay throughout the B horizon and are below the Hickory soils on the landscape.

Typical pedon of Hickory silt loam, 12 to 18 percent slopes, 1,425 feet north and 450 feet east of southwest corner of sec. 30, T. 15 N., R. 5 W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; medium acid; clear smooth boundary.

A2—4 to 8 inches; brown (10YR 4/3) silt loam; moderate thin platy structure parting to moderate fine subangular blocky; friable; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine light gray (10YR 7/1) dry uncoated silt grains; medium acid; clear smooth boundary.

B1t—8 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; very fine and fine subangular blocky structure; firm; many fine roots; thin continuous brown (10YR 4/3) clay films; few sand grains and small till pebbles; strongly acid; clear smooth boundary.

B21t—11 to 17 inches; dark yellowish brown (10YR 4/4) clay loam; few fine distinct red (2.5YR 4/6) mottles; moderate fine and medium subangular blocky structure; firm; common fine roots; thin continuous brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—17 to 23 inches; yellowish brown (10YR 5/6) clay loam; few fine distinct red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; few black (5YR 2/1) iron and manganese concretions; strongly acid; clear smooth boundary.

B23t—23 to 36 inches; olive brown (2.5Y 4/4) clay loam; moderate medium prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; thin discontinuous dark brown (10YR 3/3) and grayish brown (10YR 5/2) clay films on faces of peds; few black (5YR 2/1) iron and manganese stains and concretions; strongly acid; gradual smooth boundary.

B31t—36 to 51 inches; olive brown (2.5Y 4/4) heavy loam; few fine distinct (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; firm; few fine roots; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; few black (5YR 2/1) iron and manganese stains; neutral; gradual smooth boundary.

B32t—51 to 62 inches; light olive brown (2.5Y 5/4) heavy loam; few medium distinct yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; thin discontinuous brown to dark brown (10YR 4/3) clay films on faces of peds; common black (5YR 2/1) iron and manganese stains; neutral; clear smooth boundary.

C—62 to 70 inches; mixed light olive brown (2.5Y 5/4) and dark yellowish brown (10YR 3/4) loam; few medium distinct grayish brown (10YR 5/2) mottles; few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few fine pebbles; strong effervescence; moderately alkaline.

The solum is 45 to 65 inches thick. The depth to free carbonates is 45 to 65 inches. The A horizon is 5 to 12 inches thick.

The A1 horizon has color value of 3 or 4. It is dominantly silt loam, but in some pedons it is loam. The A2 horizon has value of 4 or 5 and chroma of 3 or 4. It is dominantly silt loam, but in some pedons it includes loam. The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 to 6. Reaction ranges from medium acid to strongly acid.

Huntsville series

The Huntsville series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in recent alluvial deposits. The slope ranges from 0 to 2 percent.

Huntsville soils are similar to Ross soils and are commonly adjacent to Lawson, Radford, Ross, and Tice soils. Lawson soils are somewhat poorly drained. Radford soils are not cumulic and are somewhat poorly drained. Ross soils have more sand in the B horizon. Tice soils have a mollic epipedon 14 to 24 inches thick.

Typical pedon of Huntsville silt loam, 90 feet north and 110 feet east of center of sec. 28, T. 17 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; few fine faint dark brown (10YR 3/3) mottles; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 33 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; fine granular structure; friable; neutral; diffuse smooth boundary.

A13—33 to 51 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; neutral; diffuse smooth boundary.

C—51 to 60 inches; dark brown (10YR 3/3) silt loam; massive; friable; thin discontinuous very dark grayish brown (10YR 3/2) organic channel linings; neutral.

The solum is 50 to 60 inches thick. The mollic epipedon is at least 24 inches thick and is mainly 50 to 60 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 to 3. It is dominantly silt loam; loam and thin strata of sandy loam are common below a depth of 40 inches. Reaction ranges from neutral to mildly alkaline.

Ipava series

The Ipava series consists of deep, somewhat poorly drained, moderately slowly permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 3 percent.

Ipava soils are commonly adjacent to Sable, Tama, and Virden soils. Sable soils have less clay in the B horizon than the Ipava soils and are poorly drained. Tama soils have less clay in the B horizon and are well drained. Virden soils have an A horizon of silty clay loam and are in lower lying areas.

Typical pedon of Ipava silt loam, 84 feet south and 2,058 feet east of NW corner of sec. 25, T. 17 N., R. 4 W.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate very fine and fine granular structure; friable; medium acid; abrupt smooth boundary.

A12—8 to 16 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; medium acid; clear smooth boundary.

A3—16 to 21 inches; very dark gray (10YR 3/1) light silty clay loam, gray (10YR 5/1) dry; moderate very fine subangular blocky structure; firm; slightly acid; clear smooth boundary.

B21t—21 to 28 inches; brown or dark brown (10YR 4/3) heavy silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; strong fine subangular blocky structure; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—28 to 36 inches; grayish brown (10YR 5/2) heavy silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine distinct yellowish brown (10YR 6/8) mottles; weak medium prismatic structure parting to strong medium and coarse subangular blocky; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B23t—36 to 44 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium and coarse prismatic structure parting to strong coarse subangular blocky; firm; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; some very dark grayish brown (10YR 3/2) organic coatings; slightly acid; clear smooth boundary.

B3—44 to 51 inches; mixed yellowish brown (10YR 5/6) and grayish brown (2.5Y 5/2) light silty clay loam; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few thick very dark grayish brown (10YR 3/2) organic coatings and dark grayish brown (10YR 4/2) clay films in wormholes and root channels; neutral; clear wavy boundary.

C1--51 to 59 inches; mixed yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) silt loam; massive; friable; dark grayish brown (10YR 4/2) clay films in large root channels; slight effervescence; mildly alkaline.

C2—59 to 63 inches; yellowish brown (10YR 5/8) silt loam; common medium distinct light brownish gray (2.5Y 6/2) mottles; massive; friable; slight effervescence; mildly alkaline.

The solum is 42 to 65 inches thick. In most pedons the depth to free carbonates is also 42 to 65 inches. The mollic epipedon is 14 to 24 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR or 2.5Y and value of 4 or 5 in the upper part and 4 to 6 in the lower part. It has chroma of 2 or 3 in the upper part and 2 to 6 in the lower part. The B horizon is dominantly silty clay loam, but in some pedons the B3 horizon is silt loam. Reaction in the B horizon is dominantly medium acid to neutral; it ranges to mildly alkaline in the lower part.

Kendall series

Kendall series consists of deep, somewhat poorly drained, moderately permeable soils on loess-covered stream terraces. These soils formed in 40 to 60 inches of loess and in the underlying stratified, loamy outwash. The slope ranges from 0 to 3 percent.

Kendall soils are commonly adjacent to Camden, Elburn, Plano, and Sexton soils. Camden soils formed in less than 36 inches of loess and silty material, and they have steeper slopes than Kendall soils. Elburn and Plano soils have a mollic epipedon. Also, Plano soils are dominantly steeper than Kendall soils. Sexton soils have more clay in the argillic horizon and are in shallow depressions.

Typical pedon of Kendall silt loam, 240 feet south and 1,010 feet west of NE corner of sec. 4, T. 15 N., R. 4 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; few fine distinct black (10YR 2/1) and dark yellowish brown (10YR 4/4) mottles; moderate fine granular structure; friable; few fine roots; strongly acid; clear smooth boundary.

A2—9 to 14 inches; grayish brown (10YR 5/2) silt loam; few fine distinct black (10YR 2/1) and dark yellowish brown (10YR 4/4) mottles; moderate fine platy structure; friable; few fine roots; strongly acid; clear smooth boundary.

B1t—14 to 18 inches; brown (10YR 4/3) silty clay loam; few fine faint grayish brown (10YR 5/2) and few fine prominent black (10YR 2/1) mottles; moderate fine subangular blocky structure; firm; few fine roots; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; many light gray (10YR 7/1) uncoated sand grains; strongly acid clear smooth boundary.

B21t—18 to 24 inches; brown (10YR 5/3) silty clay loam; common medium distinct dark yellowish brown (10YR 4/4) and few fine prominent black (10YR 2/1) mottles; moderate fine and medium subangular blocky structure; firm; few fine roots; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; common light gray (10YR 7/1) uncoated sand grains; strongly acid; clear smooth boundary.

B22t—24 to 32 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4 and 5/6), few fine distinct dark brown (7.5YR 4/4), and few fine prominent very dark gray (10YR 3/1) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few light gray (10YR 7/1) uncoated silt and sand grains; very strongly acid; gradual smooth boundary.

B23t—32 to 41 inches; grayish brown (10YR 5/2) silty clay loam; moderate medium distinct yellowish brown (10YR 5/6), few fine distinct dark brown (7.5YR 4/4), and few fine prominent very dark gray (10YR 3/1) mottles; moderate medium prismatic structure; firm; dark grayish brown (10YR 4/2) channel fillings; common light gray (10YR 7/1) uncoated silt and sand grains; strongly acid; gradual smooth boundary.

B3—41 to 54 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/4), few fine faint gray (10YR 6/1), and few fine distinct dark brown (7.5YR 4/4) mottles; weak coarse prismatic structure; firm; dark grayish brown (10YR 4/2) channel linings; slightly acid; gradual smooth boundary.

IIC—54 to 60 inches; mottled grayish brown (10YR 5/2), yellowish brown (10YR 5/4), and gray (10YR 6/1) stratified clay loam, loam, and sandy loam; massive; friable; natural.

The solum is 50 to 65 inches thick. The A horizon is 12 to 16 inches thick.

The A horizon has color value of 4 or 5. The B horizon has value of 4 or 5 and chroma of 2 to 4. It is dominantly silty clay loam, but in some pedons the B3 horizon is loam. Reaction ranges from strongly acid to slightly acid. The IIC horizon is stratified loamy outwash with layers of silt loam, loam, sandy loam, sandy clay loam, and clay loam.

Keomah series

The Keomah series consists of deep, somewhat poorly drained, moderately slowly permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 2 percent.

Keomah soils are commonly adjacent to Fayette, Ipava, and Middletown soils. Fayette and Middletown soils have less clay in the B horizon. Ipava soils have a mollic epipedon.

Typical pedon of Keomah silt loam, 226 feet west and 2,258 feet south of center of sec. 19, T. 14 N., R. 4 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light gray (10YR 7/2) dry; few fine prominent black (10YR 2/1) mottles; weak fine granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

A2—8 to 12 inches; mixed grayish brown (10YR 5/2) and light grayish brown (10YR 6/2) silt loam; few fine prominent black (10YR 2/1) mottles; weak fine platy structure; friable; common fine roots; medium acid; clear smooth boundary.

B21t—12 to 16 inches; brown (10YR 4/3) heavy silty clay loam; few fine distinct yellowish brown (10YR 5/6) and few fine prominent black (10YR 2/1) mottles; moderate fine subangular blocky structure; firm; common fine roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; many light gray (10YR 7/1) dry uncoated silt grains; strongly acid; clear smooth boundary.

B22t—16 to 25 inches; grayish brown (10YR 5/2) heavy silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine prominent black (10YR 2/1) mottles; moderate medium subangular blocky structure; firm; common fine roots; thick continuous dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; gradual smooth boundary.

B23t—25 to 41 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and few fine prominent very dark grayish brown (10YR 3/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; thick continuous dark gray (10YR 4/1) and dark grayish brown (10YR 4/2) clay films on faces of peds; black (10YR 2/1) channel fillings; neutral; gradual smooth boundary.

B3t—41 to 47 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) and few fine prominent very dark grayish brown (10YR 3/2) mottles; weak medium subangular blocky structure; friable; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; black (10YR 2/1) channel fillings; neutral; gradual smooth boundary.

C—47 to 60 inches; gray (10YR 6/1) silt loam; many coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) and few fine prominent black (10YR 2/1) mottles; massive; friable; dark grayish brown (10YR 4/2) channel fillings; slight effervescence; moderately alkaline.

The solum is 40 to 57 inches thick. The A horizon is 10 to 16 inches thick.

The B2t horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Reaction ranges from neutral to strongly acid. The C horizon has color value of 4 to 7 and chroma of 1 to 8.

Lawson series

The Lawson series consists of deep, somewhat poorly drained, moderately permeable soils on the bottom land of major streams. These soils formed in recent alluvial deposits. The slope ranges from 0 to 2 percent.

Lawson soils are similar to Radford soils and are commonly adjacent to Radford, Sawmill, and Tice soils. Radford and Tice soils have a mollic epipedon less than 24 inches thick. Sawmill and Tice soils have more clay in the control section and have a B horizon.

Typical pedon of Lawson silt loam, 500 feet north and 60 feet west of center of sec. 13, T. 17 N., R. 5 W.

A11—0 to 5 inches; very dark brown (10YR 2.2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; slightly acid; clear smooth boundary.

A12—5 to 22 inches; black (10YR 2/1) silt loam; grayish brown (10YR 5/2) dry; weak fine granular structure; friable; slightly acid; gradual smooth boundary.

A13—22 to 33 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable slightly acid; gradual smooth boundary.

A14—33 to 41 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; slightly acid; gradual smooth boundary.

C—41 to 60 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; friable; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid.

The solum is 30 to 60 inches thick. The mollic epipedon is 30 to 60 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. Reaction ranges from slightly acid to neutral.

Middletown series

The Middletown series consists of deep, well drained soils on loess-covered uplands. These soils formed in 40 to 60 inches of loess and in the underlying sandy material. The soil material that formed in the loess is moderately permeable, and the soil material that formed in the underlying sandy material is rapidly permeable. The slope ranges from 1 to 7 percent.

Middletown soils are similar to Fayette soils and are adjacent to Alvin, Broadwell, Fayette, Keomah, and Thebes soils. Alvin soils have more sand in the B horizon and are dominantly steeper. Broadwell soils have a mollic epipedon. Fayette soils formed in loess. Keomah soils are fine textured. Thebes soils have contrasting textures of sandy or sandy-skeletal within 40 inches.

Typical pedon of Middletown silt loam, 1 to 4 percent slopes, 20 feet west and 1,145 feet south of NE corner of sec. 26, T. 17 N., R. 6 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine and medium granular structure; friable; neutral; abrupt smooth boundary.

A2—9 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak medium platy structure; friable; neutral; clear smooth boundary.

B21t—12 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; thin continuous dark brown or brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—17 to 35 inches; dark yellowish brown (10YR 4/5) silty clay loam; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine black (5YR 2/1) iron and manganese concretions; strongly acid; gradual smooth boundary.

B31—35 to 44 inches; dark yellowish brown (10YR 4/5) light silty clay loam; moderate coarse subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; few fine black (5YR 2/1) iron and manganese concretions; medium acid; clear smooth boundary.

IIB32—44 to 47 inches; dark yellowish brown (10YR 4/4) clay loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 4/3) clay films on vertical faces of peds; medium acid; abrupt smooth boundary.

IIB33—47 to 52 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak coarse subangular blocky structure; medium acid; gradual smooth boundary.

IIC—52 to 60 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose; slightly acid.

The solum is 45 to 65 inches thick. The depth to loamy sand or sand is 40 to 60 inches. The A horizon is 8 to 14 inches thick.

The A horizon has color value of 3 to 5 and chroma of 2 to 4. The value is 3 in pedons where an A1 horizon less than 4 inches thick. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from slightly acid to very strongly acid.

Plano series

The Plano series consists of deep, well drained, moderately permeable soils on loess-covered stream terraces. These soils formed in 40 to 60 inches of loess and in the underlying stratified loamy and sandy outwash. The slope ranges from 0 to 7 percent.

Plano soils are commonly adjacent to Camden, Elburn, Kendall, and Sexton soils. Camden, Kendall, and Sexton soils do not have a mollic epipedon. Sexton soils are fine textured and are poorly drained. Elburn soils are somewhat poorly drained and are nearly level.

Typical pedon of Plano silt loam, 0 to 2 percent slopes, 378 feet west and 714 feet south of NE corner of sec. 3, T. 14 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

A12—9 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; medium acid; clear smooth boundary.

B1—15 to 19 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; friable; medium acid; clear smooth boundary.

B21t—19 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; thin continuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—26 to 34 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; thin continuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B23t—34 to 42 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; firm; thin continuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

IIB31—42 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

IIB32—46 to 55 inches; yellowish brown (10YR 5/4) light silty clay loam; weak coarse subangular blocky structure; friable; thin discontinuous brown (10YR 5/3) and dark brown (10YR 3/3) clay films and light gray (10YR 7/1) dry uncoated silt grains on faces of peds; few small black (5YR 2/1) iron and manganese concretions; strongly acid; clear smooth boundary.

IIIC—55 to 60 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) stratified loamy sand and loam; massive; friable; medium acid.

The solum is 50 to 65 inches thick. The mollic epipedon is 10 to 16 inches thick.

The A horizon has color value and chroma of 2 or 3. The B2t horizon has value of 4 or 5 and chroma of 3 or 4. Reaction ranges from medium acid to strongly acid. The IIB3 horizon is silty clay loam, loam, or sandy loam. The IIIC horizon is stratified silt loam, loam, sandy loam, and loamy sand. Reaction ranges from medium acid to neutral.

Radford series

The Radford series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in recent alluvial deposits. The slope ranges from 0 to 3 percent.

Radford soils are similar to Lawson soils and are commonly adjacent to Lawson, Sawmill, and Tice soils. Lawson and Sawmill soils have a mollic epipedon thicker than 24 inches. Tice soils have a solum thicker than 30 inches, and unlike Radford soils they do not have a buried horizon of black silty clay loam.

Typical pedon of Radford silt loam, 480 feet north and 800 feet west of SW corner of sec. 33, T. 15 N., R. 6 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common fine and medium roots; slightly acid; abrupt smooth boundary.

A12—6 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

C1—15 to 22 inches; very dark gray (10YR 3/1) silt loam; thin layers (2mm) are dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2); weak fine granular structure; friable; few fine roots; slightly acid; gradual smooth boundary.

C2—22 to 32 inches; very dark gray (10YR 3/1) silt loam; thick layers (5 to 10mm) are grayish brown (10YR 5/2); weak fine granular structure; friable; few fine roots; slightly acid; clear smooth boundary.

A11b—32 to 41 inches; black (10YR 2/1) silty clay loam; moderate fine subangular blocky structure; friable; few fine roots; mildly alkaline; clear smooth boundary.

A12b—41 to 60 inches; black (10YR 2/1) silty clay loam; moderate fine subangular blocky structure; firm; very fine roots; mildly alkaline.

The A horizon, which is also the mollic epipedon, is 15 to 23 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The C horizon has value of 3 to 5 and chroma of 1 or 2. It is slightly acid or neutral. The A1b horizon has value of 2 or 3. It is slightly acid to mildly alkaline.

Ross series

The Ross series consists of deep, well drained, moderately permeable soils on flood plains and low terraces. These soils formed in recent alluvial deposits. The slope ranges from 0 to 3 percent.

Ross soils are similar to Huntsville soils and are commonly adjacent to Huntsville, Lawson, Radford, and Tice soils. These soils have less sand within a depth of 40 inches. Radford soils have a mollic epipedon 15 to 23 inches thick. Tice soils have a mollic epipedon 14 to 24 inches thick.

Typical pedon of Ross loam, 800 feet east and 580 feet south of NW corner of sec. 9, T. 15 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; few roots; neutral; abrupt smooth boundary.

A12—9 to 21 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; few roots; neutral; clear smooth boundary.

A13—21 to 35 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; friable; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

C1—35 to 46 inches; dark grayish brown (10YR 4/2) sandy loam; massive; friable; neutral; gradual smooth boundary.

C2—46 to 60 inches; brown (10YR 4/3) sandy loam; massive; friable; neutral.

The A horizon, which is also the mollic epipedon, is 30 to 40 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 to 3. The C horizon has chroma of 2 or 3. Reaction in the A and C horizons ranges from slightly acid to neutral.

Sable series

The Sable series consists of deep, poorly drained, moderately permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 2 percent.

Sable soils are similar to Virden soils and are commonly adjacent to Ipava, Tama, and Virden soils. Ipava and Virden soils are fine textured. Tama soils have an argillic horizon and are steeper.

Typical pedon of Sable silty clay loam, 2,313 feet east and 68 feet south of center of sec. 24, T. 15 N., R. 8 W.

Ap—0 to 9 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine and medium angular blocky structure; firm; slightly acid; abrupt smooth boundary.

A12—9 to 19 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; strong medium and coarse granular structure; firm; medium acid; clear smooth boundary.

B21g—19 to 25 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common medium distinct light olive brown (2.5Y 5/4) and few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate and strong medium angular blocky; firm; thick continuous black (10YR 2/1) organic coatings on faces of peds; few small dark concretions (iron-manganese oxides); slightly acid; clear smooth boundary.

B22g—25 to 34 inches; dark grayish brown (2.5Y 4/2) silty clay loam; many medium distinct light yellowish brown (2.5Y 6/4) and few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium and coarse angular blocky; firm; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; many small dark concretions (iron-manganese oxides); slightly acid; clear smooth boundary.

B3g—34 to 42 inches; grayish brown (2.5Y 5/2) heavy silt loam; many medium distinct light brownish gray (2.5Y 6/3), common medium distinct yellowish brown (10YR 5/8), and few fine faint brown (7.5YR 4/4) mottles; weak coarse angular blocky structure; firm; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; many small dark concretions (iron-manganese oxides); mildly alkaline; clear smooth boundary.

Cg—42 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct olive brown (2.5Y 5/6) and olive yellow (2.5Y 6/6) and common fine prominent yellowish brown (10YR 5/8) mottles; massive; friable; slight effervescence; mildly alkaline.

The solum is 40 to 55 inches thick. The depth to free carbonates is 40 to 55 inches. The mollic epipedon is 14 to 23 inches thick.

The B2g horizon has hue of 10YR, 2.5Y, or 5Y and value of 4 to 6. It has chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline.

Sawmill series

The Sawmill series consists of deep, poorly drained, moderately permeable soils on flood plains. These soils formed in recent alluvial deposits. The slope ranges from 0 to 2 percent.

Sawmill soils are adjacent to Lawson, Radford, and Tice soils. Lawson and Radford soils have less clay in the upper part of the solum. Tice and Radford soils have a mollic epipedon less than 24 inches thick. Lawson, Radford, and Tice soils are somewhat poorly drained.

Typical pedon of Sawmill silty clay loam, 750 feet east and 300 feet south of northwest corner of sec. 20, T. 15 N., R. 4 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine faint very dark grayish brown (10YR 3/2) mottles; weak fine subangular blocky structure; firm; few fine roots; few subrounded pebbles 1 to 3 millimeters in diameter; slightly acid; clear smooth boundary.

A12—10 to 17 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; few fine distinct yellowish brown (10YR 5/6) and few fine faint very dark grayish brown (10YR 3/2) mottles; moderate fine subangular blocky structure; firm; few fine roots; few subrounded pebbles 1 to 3 millimeters in diameter; few small dark concretions; neutral; clear smooth boundary.

A13—17 to 25 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium angular blocky structure; firm; few fine roots; few small dark concretions; neutral; clear smooth boundary.

A3—25 to 32 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; firm; few fine roots; few small dark concretions; neutral; clear smooth boundary.

B21g—32 to 40 inches; dark gray (10YR 4/1) silty clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium angular blocky; firm; few fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; few small dark concretions; mildly alkaline; clear smooth boundary.

B22g—40 to 49 inches; grayish brown (10YR 5/2) silty clay loam; few fine distinct strong brown (7.5YR 5/6) and common fine faint yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to weak medium angular blocky; firm; thick continuous dark gray (10YR 4/1) clay films on faces of peds; few small dark concretions; mildly alkaline; clear smooth boundary.

B3g—49 to 58 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; thin continuous gray (10YR 5/1) clay films on faces of peds; few small dark concretions; mildly alkaline; clear smooth boundary.

Cg—58 to 65 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; very dark gray (10YR 3/1) channel linings and fillings; mildly alkaline.

The solum is 45 to more than 60 inches thick. The mollic epipedon, which is also the A horizon, is 28 to 36 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The Bg and C horizons have hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. Reaction ranges from slightly acid to mildly alkaline.

Sexton series

The Sexton series consists of deep, poorly drained, slowly permeable soils on loess-covered terraces. These soils formed in 40 to 60 inches of loess and in the underlying stratified outwash. The slope ranges from 0 to 2 percent.

Sexton soils are commonly adjacent to Camden, Elburn, Kendall, and Plano soils. These adjacent soils are fine-silty. Camden soils formed in less than 36 inches of loess or silty material. Camden and Plano soils have an udic moisture regime and dominantly steeper slopes. Plano and Elburn soils have a mollic epipedon. Kendall soils have less clay in the B horizon.

Typical pedon of Sexton silt loam, 195 feet east and 1,600 feet south of NW corner of sec. 29, T. 15 N., R. 4 W.

Ap—0 to 10 inches; dark gray (10YR 4/1) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few fine roots; medium acid; clear smooth boundary.

A2—10 to 16 inches; grayish brown (10YR 5/2) silt loam, mixed light gray (10YR 7/2) and light brownish gray (10YR 6/2) dry; weak medium platy structure; friable; few fine roots; thin discontinuous dark gray (10YR 4/1) films on faces of peds; medium acid; clear smooth boundary.

B1t—16 to 20 inches; grayish brown (10YR 5/2) silty clay loam; few fine faint dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; few fine roots; firm thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; medium acid; clear smooth boundary.

B21t—20 to 24 inches; grayish brown (10YR 5/2) heavy silty clay loam; few fine faint yellowish brown (10YR 5/4) and few fine prominent very dark gray (10YR 3/1) mottles; moderate fine and medium subangular blocky structure; firm; thin continuous dark gray (10YR 4/1) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—24 to 34 inches; grayish brown (2.5Y 5/2) heavy silty clay loam; common medium distinct yellowish brown (10YR 5/4 and 5/6) and few fine prominent very dark gray (10YR 3/1) mottles; moderate medium subangular blocky structure; firm; thick continuous dark gray (10YR 4/1) clay films on faces of peds; strongly acid; clear smooth boundary.

B23t—34 to 46 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct strong brown (7.5YR 5/6), few fine faint gray (10YR 6/1), and few fine prominent very dark gray (10YR 3/1) mottles; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; thick continuous gray (10YR 5/1) clay films on faces of peds; medium acid; clear smooth boundary.

B3t—46 to 54 inches; gray (10YR 6/1) silty clay loam; many coarse prominent yellowish brown (10YR 5/6) and few fine prominent very dark gray (10YR 3/1) mottles; weak coarse prismatic structure; firm; thin discontinuous gray (10YR 5/1) clay films on faces of peds; slightly acid; clear smooth boundary.

IIC—54 to 60 inches; mixed gray (10YR 6/1) and yellowish brown (10YR 5/6) stratified silt loam and loam;

massive; friable; dark gray (10YR 4/1) and very dark gray (10YR 3/1) channel linings and fillings; slightly acid.

The solum is 50 to 60 inches thick. The A horizon is 15 to 20 inches thick.

The Ap horizon has chroma of 1 or 2. The B horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Reaction is slightly acid to strongly acid. In some pedons there is a IIB horizon, which consists of stratified sandy loam or sandy clay loam. The IIC horizon is stratified silt loam, loam, sandy loam, and loamy sand.

Shiloh series

The Shiloh series consists of deep, very poorly drained, slowly permeable soils on loess-covered uplands and low terraces. These soils formed in loess. The slope ranges from 0 to 2 percent.

Shiloh soils are similar to Virden soils and are commonly adjacent to Edinburg, Ipava, Sable, and Virden soils. All these soils have a thinner mollic epipedon than that of the Shiloh soils. Sable soils have less clay in the B horizon.

Typical pedon of Shiloh silty clay loam, 1,980 feet east and 61 feet south of NW corner of sec. 12, T. 15 N., R. 6 W.

Ap—0 to 9 inches; black (10YR 2/1) heavy silty clay loam, dark gray (10YR 4/1) dry; weak very fine granular structure; friable; common fine roots; neutral; clear smooth boundary.

A12—9 to 18 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate very fine granular structure; firm; common fine roots; neutral; clear smooth boundary.

B21—18 to 25 inches; black (10YR 2/1) heavy silty clay loam, dark gray (10YR 4/1) dry; few fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common fine roots; neutral; gradual smooth boundary.

B22g—25 to 33 inches; very dark gray (10YR 3/1) silty clay; few fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; thin continuous black (10YR 2/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

B23g—33 to 44 inches; olive gray (5Y 5/2) heavy silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to weak medium subangular blocky; firm; few fine roots; thick continuous dark grayish brown (10YR 4/2) clay films on faces of peds; mildly alkaline; gradual smooth boundary.

B3g—44 to 56 inches; gray (5Y 6/1) silty clay loam; many coarse prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; firm; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; mildly alkaline; gradual smooth boundary.

Cg—56 to 60 inches; gray (5Y 6/1) light silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6) mottles; massive; friable; large krotovina filled with black (10YR 2/1) clayey material; mildly alkaline.

The solum is 48 to 60 inches thick. The depth to free carbonates is also 48 to 60 inches. The mollic epipedon, which includes the A horizon and the upper part of the B horizon, is 28 to 36 inches thick.

The A horizon is silty clay loam or silty clay and has color value of 2 or 3 and chroma of 0 or 1. The B2g horizon has hue of 10YR, 2.5Y, or 5Y; value of 2 to 5; and chroma of 1 or 2. It is silty clay or silty clay loam; on the average, it is 35 to 42 percent clay. Reaction ranges from slightly acid to mildly alkaline.

Sylvan series

The Sylvan series consists of deep, well drained, moderately permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 4 to 18 percent.

Sylvan soils are similar to Fayette soils and are commonly adjacent to Elco, Fayette, and Keomah soils. Elco soils formed in loess and till and have a paleosol within a depth of 20 to 40 inches. Fayette soils have a thicker solum than that of Sylvan soils and do not have calcareous loess above a depth of 40 inches. Keomah soils are fine textured and are nearly level.

Typical pedon of Sylvan silt loam, 4 to 7 percent slopes, eroded, 885 feet north and 790 feet east of SW corner of sec. 16, T. 17 N., R. 5 W.

Ap—0 to 7 inches; brown or dark brown (10YR 4/3) silt loam; few fine faint yellowish brown (10YR 5/4) mottles; weak fine granular structure; friable; neutral; abrupt smooth boundary.

B21t—7 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; thin discontinuous brown or dark brown (10YR 4/3) clay films on faces of peds; few thin black (10YR 2/1) iron and manganese stains; slightly acid; clear smooth boundary.

B22t—15 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium and coarse subangular blocky structure; friable; thin discontinuous brown or dark brown (10YR 4/3) and dark brown (10YR 3/3) clay films on faces of peds; few thin black (10YR 2/1) iron and manganese stains; slightly acid; clear smooth boundary.

B3—23 to 29 inches; yellowish brown (10YR 5/4) light silty clay loam; common fine distinct light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; abrupt smooth boundary.

C—29 to 60 inches; mixed light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt loam; massive; friable; few small iron and manganese concretions; strong effervescence; moderately alkaline.

The solum is 22 to 35 inches thick. The depth to free carbonates is also 22 to 35 inches. The Ap horizon is 4 to 8 inches thick.

The Ap horizon has color value of 4 or 5 and chroma of 3 or 4. It is silt loam or light silty clay loam. The B horizon has color value and chroma of 4 or 5. Reaction ranges from medium acid to neutral.

Tama series

The Tama series consists of deep, well drained, moderately permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 12 percent.

Tama soils are similar to Elkhart soils and are commonly adjacent to Assumption, Elkhart, and Ipava soils. Assumption soils formed in loess and till, and they have a paleosol within a depth of 20 to 40 inches. Elkhart soils have a thinner solum than that of Tama soils and have free carbonates within a depth of 22 to 35 inches. Ipava soils are fine textured and are nearly level.

Typical pedon of Tama silt loam, 2 to 4 percent slopes, 501 feet south and 76 feet west of center of sec. 1, T. 14 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

B1—9 to 15 inches; dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate very fine and fine subangular blocky structure; friable; very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B21t—15 to 20 inches; dark brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; friable; thin discontinuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B22t—20 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; few small dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

B23t—26 to 36 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct pale brown (10YR 6/3) and few fine faint yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; few small dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

B31t—36 to 44 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; thin discontinuous brown (10YR 4/3) clay films on faces of peds; few small dark concretions (iron and manganese oxides); slightly acid; gradual smooth boundary.

B32—44 to 57 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; friable; thin continuous brown (10YR 4/3) clay films on faces of peds; few small dark concretions (iron and manganese oxides); black (10YR 2/1) channel fillings; neutral; clear smooth boundary.

C—57 to 68 inches; mixed light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) silt loam; massive; friable; many small dark concretions (iron and manganese oxides); strong effervescence; moderately alkaline.

The solum is 40 to 61 inches thick. The mollic epipedon, which includes the B1 horizon, is 10 to 22 inches thick.

The Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The Bt horizon has color value of 4 or 5 and chroma of 3 or 4. Reaction ranges from neutral to strongly acid.

Thebes series

The Thebes series consists of deep, well drained soils on loess-covered uplands. These soils are moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. They formed in 20 to 40 inches of loess and the underlying loamy sand or sand. The slope ranges from 7 to 15 percent.

Thebes soils are commonly adjacent to Alvin, Broadwell, Fayette, and Middletown soils. Alvin soils have less clay in the B horizon. Broadwell, Fayette, and Middletown soils have less sand throughout the B horizon. Broadwell soils have a mollic epipedon, and Fayette soils formed in loess.

Typical pedon of Thebes silty clay loam, 7 to 15 percent slopes, severely eroded, 500 feet east and 560 feet south of center of sec. 12, T. 16 N., R. 4 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) light silty clay loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky structure; friable; neutral; abrupt smooth boundary.

B21t—8 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; thin continuous brown (10YR 4/3) clay films on faces of peds; few small very dark grayish brown (10YR 3/2) iron and manganese concretions; medium acid; clear smooth boundary.

B22t—17 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak and moderate medium subangular blocky structure; friable; thin discontinuous brown (10YR 4/3) clay films on faces of peds; few small dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B23t—22 to 33 inches; yellowish brown (10YR 5/4) light silty clay loam; common medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; weak and moderate medium and coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; few small dark concretions (iron and manganese oxides); very strongly acid; clear smooth boundary.

IIB3—33 to 37 inches; yellowish brown (10YR 5/4) loam; few fine faint yellowish brown (10YR 5/8) and few fine distinct light brownish gray (10YR 6/2) mottles; weak and moderate medium and coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; few small dark concretions (iron and manganese oxides); very strongly acid; abrupt smooth boundary.

IIC1—37 to 53 inches; dark yellowish brown (10YR 4/4) loamy sand; massive; friable; common small dark concretions (iron and manganese oxides); slightly acid; abrupt smooth boundary.

IIC2—53 to 60 inches; mixed light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) stratified loamy sand and silt loam; massive; friable; slightly acid.

The solum is 24 to 40 inches thick. The Ap horizon is 6 to 9 inches thick. In uncultivated areas, the A horizon is 6 to 11 inches thick.

The Ap or A1 horizon has chroma of 2 or 3. Texture ranges from silt loam to light silty clay loam. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. Reaction ranges from slightly acid to very strongly acid. The IIB3 horizon is commonly loam but ranges to sandy clay loam. The IIC horizon is loamy sand or sand and has thin strata of silt loam.

Tice series

The Tice series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in recent alluvial deposits. The slope ranges from 0 to 3 percent.

Tice soils are commonly adjacent to Lawson, Radford, and Sawmill soils. Lawson soils developed in silt loam alluvium and have a mollic epipedon 30 to 60 inches thick. Radford soils have an A horizon of silt loam overlying a buried horizon of black silty clay loam. Sawmill soils have a mollic epipedon 28 to 36 inches thick.

Typical pedon of Tice silty clay loam, 450 feet south and 2,300 feet east of NW corner of sec. 35, T. 16 N., R. 2 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; few fine roots; neutral; abrupt smooth boundary.

A12—8 to 20 inches; very dark grayish brown (10YR 3/2) silty clay loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure; firm; few fine roots; neutral; clear smooth boundary.

B1—20 to 27 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine faint dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; few small black concretions (iron and manganese oxides); neutral; clear smooth boundary.

B2—27 to 39 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct dark brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; few small black concretions (iron and manganese oxides); neutral; clear smooth boundary.

B3—39 to 51 inches; dark grayish brown (10YR 4/2) light silty clay loam; common medium faint dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; slightly firm; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds and channel fillings; few small black concretions (iron and manganese oxides); neutral; gradual smooth boundary.

C—51 to 60 inches; mottled dark brown (10YR 4/3) and grayish brown (10YR 5/2) loam; massive; friable; few dark gray (10YR 4/1) channel fillings; neutral.

The solum is 46 to 60 inches thick. The A horizon is 14 to 20 inches thick. The mollic epipedon is 14 to 24 inches thick.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has value of 4 or 5. It is slightly acid or neutral. The B3 horizon is dominantly silty clay loam; in some pedons it contains strata of silt loam or loam. The C horizon is stratified silty clay loam, silt loam, loam, or sandy loam.

Virden series

The Virden series consists of deep, poorly drained, moderately slowly permeable soils on loess-covered uplands. These soils formed in calcareous loess. The slope ranges from 0 to 1 percent.

Virden soils are similar to Sable soils and are commonly adjacent to Ipava, Sable, and Tama soils. Ipava soils have a silt loam A horizon, are somewhat poorly drained, and are in higher lying areas. Sable and Tama soils have less clay in the B horizon. Tama soils are well drained and are steeper.

Typical pedon of Virden silty clay loam, 380 feet east and 138 feet south of NW corner of sec. 19, T. 14 N., R. 5 W.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; friable; common medium roots; medium acid; abrupt smooth boundary.

A12—10 to 15 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak very fine angular blocky structure parting to weak medium granular; firm; common fine roots; slightly acid; clear smooth boundary.

B21t—15 to 20 inches; very dark gray (10YR 3/1) heavy silty clay loam, dark gray (10YR 4/1) dry; few fine faint olive gray (5Y 4/2) mottles; weak fine and medium angular blocky structure; firm; few fine roots; thin continuous very dark gray (10YR 3/1) organic coatings on faces of peds; few small strong brown (7.5YR 5/8) concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

B22tg—20 to 24 inches; olive gray (5Y 5/2) heavy silty clay loam; moderate medium prismatic structure parting to moderate medium and coarse angular blocky; firm; common fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; few small strong brown (7.5YR 5/8) and black (N 2/0) concretions (iron and manganese oxides); neutral; clear smooth boundary.

B23tg—24 to 32 inches; olive gray (5Y 5/2) silty clay loam; common fine distinct light yellowish brown (2.5Y 6/4) and few fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium prismatic structure parting to moderate medium and coarse angular blocky; firm; common fine roots; thin discontinuous very dark gray (10YR 3/1) organic coatings on faces of peds; few small black (N 2/0) concretions (iron and manganese oxides); neutral; clear smooth boundary.

B24tg—32 to 38 inches; light olive gray (5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 5/8) and many medium distinct light olive brown (2.5Y 5/4) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; firm; few fine roots; thin discontinuous dark gray (5Y 4/1) clay films on faces of peds; few small dark concretions (iron and manganese oxides); neutral; clear smooth boundary.

B3g—38 to 48 inches; light olive gray (5Y 6/2) light silty clay loam; many medium distinct light olive brown (2.5Y 5/4) and many medium and coarse prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; few fine roots; thin discontinuous dark gray (5Y 4/1) clay films on faces of peds; few small dark concretions (iron and manganese oxides); neutral; gradual smooth boundary.

Cg—48 to 61 inches; mottled light olive gray (5Y 6/2), yellowish brown (10YR 5/8), and light olive brown (2.5Y 5/4) silt loam; massive; friable; slight effervescence; mildly alkaline.

The solum is 44 to 60 inches thick. The mollic epipedon is 19 to 24 inches thick. The A horizon is 13 to 19 inches thick.

The B2tg horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 to 6; and chroma of l or 2. The argillic horizon in the upper 20 inches is 35 to 40 percent clay; the highest percentage of clay is in the upper part. Reaction ranges from slightly acid to mildly alkaline. The C horizon ranges from silt loam to light silty clay loam. It is neutral to mildly alkaline.

Formation of the soils

The characteristics of a soil are determined by the parent material, the climate, the plant and animal life on and in the soil, topography, and time.

Parent material

The soils of Sangamon County formed in loess, alluvium, glacial till, glacial outwash, eolian sand, and material that weathered from the bedrock. Loess is the most extensive parent material because it covers most of the other materials.

The loess consists of Peoria loess and Roxana silt. On nearly level uplands it ranges in thickness from about 15 feet in the north to 6 or 7 feet in the south. The Ipava, Sable, Tama, and Virden soils formed entirely in loess. In sloping and steep areas, the layer of loess is thinner. The Assumption and Elco soils formed in loess and the underlying glacial till. In other areas, the soils formed in loess and in windblown sand, which is below the loess, commonly at a depth of more than 40 inches. Broadwell and Middletown soils are examples.

Soils on bottom lands formed in recent alluvial material that eroded from soils on uplands. Most of these bottom land soils are still receiving sediment. These soils are mainly loam, silt loam, and silty clay loam. Lawson, Radford, Ross, and Sawmill soils are examples.

Glacial till of Illinoian age underlies the loess in most of Sangamon County. On many side slopes along the major drainageways, erosion removed the loess, and Hickory soils formed in the remaining till. Terraces in some of the stream valleys consist of glacial outwash deposits. These deposits are mostly sand and some silt and clay. They are covered with a layer of loess that is mainly 40 to 60 inches thick. Plano and Elburn soils formed on these terraces. In some places, the layer of loess is not so thick, and here, Camden soils formed in the loess and the underlying coarser textured outwash.

In places, areas of Parkland sand border the Sangamon River and its major tributaries. Alvin soils formed in this material.

In Sangamon County, bedrock of the Pennsylvanian period underlies the loess and the glacial material. This bedrock consists mainly of shale, sandstone, and limestone. In a few areas along the major streams, shale bedrock is the surface deposit. The Gosport soils formed in material that weathered from this bedrock.

Climate

The climate in Sangamon County has been mostly uniform during the formation of the soils. Because of this uniformity, none of the soils have characteristics caused entirely by differences in climate within the county.

Climate is important in soil formation because it influences the variety of plants that grow and largely determines the type of weathering that takes place. The rate of weathering increases as temperature and precipitation increase. Well distributed rainfall, in areas of grass vegetation, and seasonal freezing temperatures promote the accumulation of organic matter in most of the soils. The rainfall also leaches free carbonates from most of the soils. The soils that formed under forest vegetation have properties that were influenced more by the vegetation and by topography than by climatic differences. Because of differences in climate, the rate of weathering is greater in areas of forest vegetation than in areas of grass vegetation.

Plant and animal life

All living organisms are important to soil formation. Vegetation is generally responsible for the amount of organic matter and nutrients in the soil and for the color of the surface soil. Animals, such as earthworms, cicadas, and burrowing animals, help to keep the soil open and porous. Bacteria decomposes the vegetation and helps to release nutrients for use by plants. However, with few exceptions, the role of animals in supplying the soil with organic matter is secondary to that of plants, even though animals are important in many places (*5*).

The soils that formed under prairie grasses are dark, are high in content of organic matter, and have a granular surface soil. Broadwell, Ipava, Sable, and Tama soils are examples. The soils that formed under trees have a lighter colored surface soil, are more acid and less fertile, and are lower in content of organic matter. Fayette, Hickory, Middletown and Sylvan soils are examples. The soils on the bottom lands are dark colored, mainly because the water-laid material is dark colored.

Topography

Many of the differences among the soils in Sangamon County reflect differences in topography. Slope affects drainage, erosion, runoff, and deposition. The gradient, length, and shape of the slope are responsible for differences among soils that are derived from the same parent material, for example, Ipava, Sable, and Tama soils. In addition, the color of the subsoil is greatly influenced by drainage, which is mainly determined by topography.

As the slope gradient increases, runoff becomes greater, and less water infiltrates the soil. As a result, less clay is moved downward by water into the subsoil of the more sloping soils. The sloping Fayette soils, for example, have less clay in the subsoil than the nearly level Keomah soils. Also, erosion increases as runoff increases, resulting in changes in soil properties.

Time

Time is needed for soils to form from parent material. The age of a soil is determined by the degree of development of its horizons.

Horizon development depends not only on the length of time that the soil has been forming but also on the other factors of soil formation. Denny soils and Tama soils formed in loess. However, because of other soil forming factors, mainly topography, Denny soils have more distinct horizons than Tama soils. Denny soils also have an albic horizon and a subsoil that is high in content of clay; these features indicate a high degree of development. Lawson soils, on flood plains, have weakly expressed horizons. In terms of maturity, Tama soils are between the less mature Lawson and the more mature Denny soils.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock. Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.
Low strength. The soil is not strong enough to support loads.
Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.
Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.
Miscellaneous areas. Areas that have little or no natural soil and support little or no vegetation.
Moderately coarse textured soil. Sandy loam and fine sandy loam.
Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.
Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.
Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).
Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.
Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)
Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.
Paleosol. A buried soil horizon.
Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.
Parent material. The unconsolidated organic and mineral material in which soil forms.
Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.
Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.
Percolation. The downward movement of water through the soil.
Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.
Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, differences in slope, stoniness, and thickness.
pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)
Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.
Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.
Plastic limit. The moisture content at which a soil changes from semisolid to plastic.
Plowpan. A compacted layer formed in the soil directly below the plowed layer.
Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.
Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under specific management.
Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.
Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction be-

cause it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsidence. Downward movement of the ground surface caused by solution and collapse of underlying soluble deposits, rearrangement of particles upon removal of coal or rock, or reduction of fluid pressures within an aquifer.

Substratum. The part of the soil below the solum.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-75 at Springfield, Illinois]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	34.1	17.7	25.9	63	-12	13	1.64	.79	2.33	5	5.2
February---	38.8	21.9	30.4	67	-7	20	1.80	1.01	2.44	5	6.1
March------	48.7	30.0	39.4	80	5	155	2.86	1.49	3.96	7	4.4
April------	63.9	42.5	53.2	86	24	396	4.12	2.18	5.70	8	.7
May--------	74.3	52.4	63.4	93	34	725	3.32	2.06	4.45	8	.0
June-------	84.0	62.1	73.1	98	45	993	3.99	1.79	5.77	7	.0
July-------	86.8	65.7	76.2	99	49	1,122	3.71	2.03	5.08	6	.0
August-----	84.7	63.7	74.2	97	48	1,060	3.07	1.44	4.40	5	.0
September--	79.0	55.8	67.4	96	37	822	3.07	1.37	4.44	6	.0
October----	68.0	45.0	56.5	89	24	512	2.53	.94	3.80	4	.0
November---	51.3	33.0	42.2	77	10	136	2.05	1.14	2.78	5	2.4
December---	38.4	23.3	30.9	67	-7	43	2.03	.86	2.97	6	4.7
Year-----	62.7	42.8	52.7	101	-14	5,997	34.19	29.82	38.41	72	23.5

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-75 at Springfield, Illinois]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 11	April 23	May 1
2 years in 10 later than--	April 6	April 18	April 26
5 years in 10 later than--	March 28	April 8	April 18
First freezing temperature in fall:			
1 year in 10 earlier than--	October 22	October 15	October 8
2 years in 10 earlier than--	October 27	October 20	October 12
5 years in 10 earlier than--	November 5	October 29	October 21

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-75 at Springfield, Illinois]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	202	182	169
8 years in 10	209	189	175
5 years in 10	222	203	185
2 years in 10	235	217	196
1 year in 10	242	224	202

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
8D3	Hickory clay loam, 7 to 12 percent slopes, severely eroded	645	0.1
8E	Hickory silt loam, 12 to 18 percent slopes	3,165	0.6
8E3	Hickory clay loam, 12 to 18 percent slopes, severely eroded	1,945	0.3
8F	Hickory silt loam, 18 to 50 percent slopes	6,740	1.2
17	Keomah silt loam	15,770	2.8
19C2	Sylvan silt loam, 4 to 7 percent slopes, eroded	1,760	0.3
19D	Sylvan silt loam, 7 to 12 percent slopes	240	*
19D3	Sylvan silty clay loam, 7 to 12 percent slopes, severely eroded	1,830	0.3
19E3	Sylvan silty clay loam, 12 to 18 percent slopes, severely eroded	385	0.1
36A	Tama silt loam, 0 to 2 percent slopes	8,095	1.4
36B	Tama silt loam, 2 to 4 percent slopes	62,550	11.0
36C2	Tama silt loam, 4 to 7 percent slopes, eroded	20,300	3.6
36D2	Tama silt loam, 7 to 12 percent slopes, eroded	3,520	0.6
43	Ipava silt loam	156,940	27.6
45	Denny silt loam	2,355	0.4
50	Virden silty clay loam	35,830	6.3
67	Harpster silty clay loam	910	0.2
68	Sable silty clay loam	59,450	10.5
73	Ross loam	1,180	0.2
74	Radford silt loam	12,515	2.2
77	Huntsville silt loam	915	0.2
107	Sawmill silty clay loam	14,855	2.6
112	Cowden silt loam	2,210	0.4
119D	Elco silt loam, 7 to 15 percent slopes	6,380	1.1
119D3	Elco silty clay loam, 7 to 12 percent slopes, severely eroded	3,365	0.6
119E3	Elco silty clay loam, 12 to 18 percent slopes, severely eroded	7,535	1.3
131C	Alvin loamy sand, 4 to 7 percent slopes	1,830	0.3
131D	Alvin loamy sand, 7 to 12 percent slopes	1,045	0.2
131E2	Alvin loamy sand, 12 to 20 percent slopes, eroded	1,440	0.3
134A	Camden silt loam, 0 to 2 percent slopes	645	0.1
134B	Camden silt loam, 2 to 4 percent slopes	780	0.1
134C2	Camden silt loam, 4 to 7 percent slopes, eroded	380	0.1
134D3	Camden silty clay loam, 7 to 12 percent slopes, severely eroded	270	*
138	Shiloh silty clay loam	1,325	0.2
198	Elburn silt loam	995	0.2
199A	Plano silt loam, 0 to 2 percent slopes	1,640	0.3
199B	Plano silt loam, 2 to 7 percent slopes	910	0.2
208	Sexton silt loam	1,155	0.2
212D3	Thebes silty clay loam, 7 to 15 percent slopes, severely eroded	1,505	0.3
242	Kendall silt loam	605	0.1
244	Hartsburg silty clay loam	22,395	3.9
249	Edinburg silty clay loam	1,495	0.3
259C	Assumption silt loam, 4 to 7 percent slopes	5,070	0.9
259D2	Assumption silt loam, 7 to 15 percent slopes, eroded	8,435	1.5
280B	Fayette silt loam, 2 to 4 percent slopes	21,525	3.8
280C2	Fayette silt loam, 4 to 7 percent slopes, eroded	8,735	1.5
280D2	Fayette silt loam, 7 to 15 percent slopes, eroded	4,655	0.8
280D3	Fayette silty clay loam, 7 to 15 percent slopes, severely eroded	1,530	0.3
284	Tice silty clay loam	5,875	1.0
451	Lawson silt loam	5,960	1.0
533	Urban land	980	0.2
551F	Gosport silt loam, 18 to 50 percent slopes	1,135	0.2
567C	Elkhart silt loam, 4 to 7 percent slopes	7,335	1.3
567D2	Elkhart silt loam, 7 to 15 percent slopes, eroded	2,030	0.4
684B	Broadwell silt loam, 2 to 4 percent slopes	610	0.1
684C2	Broadwell silt loam, 4 to 7 percent slopes, eroded	365	0.1
685B	Middletown silt loam, 1 to 4 percent slopes	2,455	0.4
685C2	Middletown silt loam, 4 to 7 percent slopes, eroded	1,545	0.3
801	Orthents, silty	175	*
862	Pits, sand	320	0.1
864	Quarry	105	*
2036B	Urban land-Tama complex, 1 to 5 percent slopes	3,235	0.6
2043	Urban land-Ipava complex	4,535	0.8
2068	Urban land-Sable complex	3,450	0.6
2119D	Urban land-Elco complex, 7 to 15 percent slopes	1,060	0.2
	Water	6,760	1.2
	Total	567,680	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM*	AUM*
8D3 Hickory	85	32	40	55	3.0	4.2	---
8E, 8E3, 8F Hickory	---	---	---	---	2.2	3.4	---
17 Keomah	113	43	52	62	4.8	8.0	---
19C2 Sylvan	90	35	40	60	4.5	7.0	---
19D Sylvan	90	35	40	60	4.5	7.0	---
19D3 Sylvan	75	25	28	40	3.2	5.3	---
19E3 Sylvan	---	---	---	---	3.0	5.0	---
36A Tama	140	49	60	85	5.3	8.6	---
36B Tama	138	48	58	83	5.2	8.6	---
36C2 Tama	117	44	55	88	4.9	8.1	---
36D2 Tama	108	41	52	81	4.5	7.5	---
43 Ipava	140	47	57	83	5.3	7.5	7.2
45 Denny	98	34	40	56	3.6	6.0	6.0
50 Virden	124	42	51	66	4.7	7.1	7.1
67 Harpster	118	40	45	67	4.5	7.0	---
68 Sable	136	46	53	77	5.1	7.1	7.1
73 Ross	130	50	55	72	5.5	7.0	---
74 Radford	120	45	50	70	5.0	6.5	---
77 Huntsville	130	45	55	80	5.5	7.9	---
107 Sawmill	125	41	46	67	4.9	7.5	8.0
112 Cowden	110	38	48	---	4.5	6.5	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM*	AUM*
119D----------------------- Elco	95	27	35	51	3.5	5.8	---
119D3---------------------- Elco	80	---	31	48	4.0	5.3	---
119E3---------------------- Elco	---	---	---	---	3.5	4.3	---
131C, 131D----------------- Alvin	75	24	35	53	3.2	5.3	---
131E2---------------------- Alvin	70	---	---	50	3.0	5.0	---
134A----------------------- Camden	125	38	48	65	5.0	8.3	---
134B----------------------- Camden	120	38	48	65	5.0	8.3	---
134C2---------------------- Camden	110	35	42	55	4.5	7.5	---
134D3---------------------- Camden	90	---	40	55	4.2	7.0	---
138------------------------ Shiloh	117	40	47	62	4.4	7.0	7.0
198------------------------ Elburn	140	45	55	85	5.5	9.1	---
199A----------------------- Plano	135	48	55	80	5.5	8.5	---
199B----------------------- Plano	130	45	52	76	5.2	8.0	---
208------------------------ Sexton	104	34	42	59	3.9	6.0	6.0
212D3---------------------- Thebes	75	24	34	48	3.0	5.0	---
242------------------------ Kendall	117	37	48	68	4.7	7.5	---
244------------------------ Hartsburg	126	43	49	80	4.5	6.5	6.0
249------------------------ Edinburg	115	39	47	62	4.2	6.5	6.9
259C----------------------- Assumption	108	34	48	68	4.3	7.2	---
259D2---------------------- Assumption	103	31	44	64	4.2	7.0	---
280B----------------------- Fayette	113	43	48	75	4.7	7.8	---
280C2---------------------- Fayette	108	41	46	70	4.5	7.5	---
280D2---------------------- Fayette	99	38	45	65	4.2	7.0	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Oats	Grass-legume hay	Bromegrass-alfalfa	Grass-clover
	Bu	Bu	Bu	Bu	Ton	AUM*	AUM*
280D3--------------------- Fayette	90	---	38	50	3.8	6.3	---
284----------------------- Tice	128	41	52	74	5.1	8.0	8.0
451----------------------- Lawson	125	40	50	80	5.0	7.8	---
533. Urban land							
551F. Gosport							
567C---------------------- Elkhart	110	31	43	72	4.5	7.0	---
567D2--------------------- Elkhart	103	32	46	65	4.3	6.6	---
684B---------------------- Broadwell	124	40	51	76	5.1	8.5	---
684C2--------------------- Broadwell	120	38	48	72	4.8	8.0	---
685B---------------------- Middletown	115	38	52	72	5.0	7.8	---
685C2--------------------- Middletown	105	35	40	68	4.6	7.2	---
801. Orthents							
862, 864. Pits and Quarry							
2036B. Urban land-Tama							
2043. Urban land-Ipava							
2068. Urban land-Sable							
2119D. Urban land-Elco							

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
8D3 Hickory	1o	Slight	Slight	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.
8E, 8E3, 8F Hickory	1r	Moderate	Moderate	Slight	Slight	White oak	85	Eastern white pine,
						Northern red oak	85	red pine,
						Black oak	---	yellow-poplar,
						Green ash	---	sugar maple,
						Bitternut hickory	---	white oak,
						Yellow-poplar	95	black walnut.
17 Keomah	2o	Slight	Slight	Slight	Slight	White oak	65	Eastern white pine,
						Northern red oak	65	Scotch pine,
								red pine,
								Norway spruce,
								European larch,
								white spruce,
								black walnut,
								sugar maple.
19C2, 19D, 19D3 Sylvan	2o	Slight	Slight	Slight	Slight	Yellow-poplar	90	White oak,
						White oak	80	black walnut,
						Northern red oak	80	northern red oak,
						Black walnut	---	green ash,
								eastern white pine,
								red pine,
								sugar maple.
19E3 Sylvan	2r	Moderate	Moderate	Moderate	Slight	Yellow-poplar	90	White oak,
						White oak	80	black walnut,
						Northern red oak	80	northern red oak,
						Black walnut	---	green ash,
								eastern white pine,
								red pine,
								sugar maple.
43 Ipava	---	---	---	---	---	---	---	Black walnut,
								eastern cottonwood,
								yellow-poplar,
								white oak,
								green ash,
								American sycamore.
45 Denny	---	---	---	---	---	---	---	Pin oak,
								green ash,
								European larch,
								black spruce.
50 Virden	---	---	---	---	---	---	---	Pin oak,
								green ash,
								European larch.
67 Harpster	---	---	---	---	---	---	---	Eastern cottonwood,
								American sycamore,
								red maple,
								green ash,
								pin oak,
								sweetgum.
68 Sable	---	---	---	---	---	---	---	Pin oak,
								green ash,
								European larch,
								eastern cottonwood.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
73: Ross	1o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Sugar maple	85 95 85	Eastern white pine, black walnut, white ash, Norway spruce, yellow-poplar.
74: Radford	---	---	---	---	---	---	---	Green ash, eastern white pine, red pine, white spruce, Norway spruce.
77: Huntsville	1o	Slight	Slight	Slight	Slight	Eastern cottonwood American sycamore Yellow-poplar Cherrybark oak Sweetgum Green ash	110 --- 98 --- --- ---	Eastern cottonwood, black walnut, American sycamore, red maple, sugar maple, green ash, common hackberry.
107: Sawmill	---	---	---	---	---	---	---	Black spruce, green ash, pin oak, European larch.
112: Cowden	---	---	---	---	---	---	---	Pin oak, green ash, water tupelo.
119D, 119D3: Elco	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Black walnut	80 --- ---	White oak, northern red oak, black walnut, green ash, eastern white pine, red pine, Scotch pine, black locust.
119E3: Elco	2r	Moderate	Moderate	Moderate	Slight	White oak Northern red oak Black walnut	80 --- ---	White oak, northern red oak, black walnut, green ash, eastern white pine, red pine, Scotch pine, black locust.
131C, 131D: Alvin	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Black walnut Yellow-poplar	80 80 --- 90	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
131E2: Alvin	2r	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black walnut Yellow-poplar	80 80 --- 90	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
134A, 134B, 134C2, 134D3 Camden	1o	Slight	Slight	Slight	Slight	Yellow-poplar White oak Northern red oak Sweetgum Green ash	95 85 85 --- ---	White oak, black walnut, green ash, eastern white pine, red pine, yellow-poplar, black locust, white ash.
138 Shiloh	---	--------	--------	--------	--------	-------------------	---	Pin oak, baldcypress, swamp white oak, green ash, water tupelo.
198 Elburn	---	--------	--------	--------	--------	-------------------	---	Black walnut, eastern cottonwood, green ash, yellow-poplar, eastern white pine.
199A, 199B Plano	---	--------	--------	--------	--------	-------------------	---	Black walnut, eastern white pine, red pine, green ash, northern red oak.
208 Sexton	3w	Slight	Moderate	Moderate	Slight	Pin oak White oak Green ash Yellow-poplar	80 --- --- 80	Baldcypress, pin oak, water tupelo, red maple.
212D3 Thebes	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Black walnut Yellow-poplar	80 80 --- 90	White oak, black walnut, green ash, sugar maple, eastern white pine, red pine.
242 Kendall	2w	Slight	Moderate	Slight	Slight	White oak Northern red oak Yellow-poplar Black walnut	80 80 90 ---	White oak, black walnut, northern red oak, green ash, eastern white pine, red pine.
244 Hartsburg	---	--------	--------	--------	--------	-------------------	---	Pin oak, green ash, European larch.
249 Edinburg	---	--------	--------	--------	--------	-------------------	---	Green ash, pin oak, European larch, black spruce.
259C, 259D2 Assumption	---	--------	--------	--------	--------	-------------------	---	Black walnut, American sycamore, green ash, yellow-poplar, common hackberry, eastern white pine.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
280B, 280C2, 280D2, 280D3 Fayette	2o	Slight	Slight	Slight	Slight	White oak Northern red oak	65 65	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, European larch, black walnut, sugar maple.
284 Tice	---	---	---	---	---	---	---	American sycamore, eastern cottonwood, green ash, yellow-poplar, red maple, cherrybark oak.
451 Lawson	4o	Slight	Slight	Slight	Slight	Silver maple White ash American elm	70 --- ---	White spruce, silver maple, white ash.
551F Gosport	5c	Moderate	Moderate	Moderate	Moderate	White oak	45	Eastern white pine, red pine, Norway spruce, Scotch pine, white spruce, poplar.
567C, 567D2 Elkhart	---	---	---	---	---	---	---	Black walnut, American sycamore, eastern cottonwood, green ash, yellow-poplar, eastern white pine, red pine, Scotch pine.
684B, 684C2 Broadwell	---	---	---	---	---	---	---	Black walnut, green ash, red maple, eastern white pine, red pine, Scotch pine.
685B, 685C2 Middletown	2o	Slight	Slight	Slight	Slight	White oak Northern red oak Black walnut	80 80 ---	White oak, northern red oak, black walnut, green ash, sugar maple, eastern white pine, red pine, Scotch pine.
2043*: Urban land.								
Ipava	---	---	---	---	---	---	---	Black walnut, eastern cottonwood, yellow-poplar, white oak, green ash, American sycamore.
2068*: Urban land.								

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
2068*:								
Sable	---	--------	--------	--------	--------	--------------------	---	Pin oak, green ash, European larch, eastern cottonwood.
2119D*:								
Urban land.								
Elco	2o	Slight	Slight	Slight	Slight	White oak	80	White oak, northern red oak, black walnut, green ash, eastern white pine, red pine, Scotch pine, black locust.
						Northern red oak	---	
						Black walnut	---	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

[The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil]

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
8D3, 8E, 8E3, 8F--Hickory	Gray dogwood, Vanhoutte spirea.	Late lilac, autumn-olive, Amur honeysuckle.	Amur maple, Russian-olive, northern white-cedar.	Norway spruce, white spruce.	Eastern white pine, red pine.
17----------------Keomah	Redosier dogwood, gray dogwood.	Bloodtwig dogwood, Tatarian honeysuckle, Siberian dogwood.	Eastern redcedar, Amur maple.	Red pine, Norway spruce, common hackberry.	Eastern cottonwood, silver maple.
19C2, 19D, 19D3, 19E3-------------Sylvan	---	Silky dogwood, gray dogwood, Amur honeysuckle.	Autumn-olive, Amur maple, Russian-olive.	Red pine, white spruce, Douglas-fir.	Eastern white pine, Norway spruce.
36A, 36B, 36C2, 36D2-------------Tama	Redosier dogwood, gray dogwood.	Siberian dogwood, bloodtwig dogwood, Tatarian honeysuckle.	Eastern redcedar, Amur maple.	Red pine, Norway spruce, Austrian pine.	Silver maple, eastern cottonwood.
43----------------Ipava	Mockorange	European burningbush, late lilac, Amur honeysuckle, American cranberrybush, autumn-olive.	Eastern hemlock, green ash.	Douglas-fir, Norway spruce.	Eastern white pine, honeylocust.
45----------------Denny	Vanhoutte spirea	Amur maple, silky dogwood, forsythia, American cranberrybush.	Flowering dogwood	European larch, black spruce, tamarack, green ash, pin oak.	---
50----------------Virden	Silky dogwood, American cranberrybush, forsythia.	Amur maple, flowering dogwood, gray dogwood.	Northern white-cedar, eastern white pine, baldcypress, red pine.	Norway spruce	Eastern cottonwood.
67----------------Harpster	Vanhoutte spirea	Silky dogwood, Amur maple, American cranberrybush, forsythia.	Russian-olive, flowering dogwood.	Tamarack, green ash, black spruce, pin oak, European larch.	---
68----------------Sable	Gray dogwood, dwarf purple willow.	Silky dogwood, Amur honeysuckle, redosier dogwood, Amur maple.	Northern white-cedar, tall purple willow, medium purple willow.	Pin oak, green ash	Lombardy poplar.
73----------------Ross	Mockorange	European burningbush, late lilac, Amur honeysuckle, American cranberrybush, autumn-olive.	Eastern hemlock	Norway spruce	Honeylocust, eastern white pine.
74----------------Radford	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, jack pine, silver maple.	---

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
77 Huntsville	Vanhoutte spirea	White fir, forsythia, gray dogwood, Amur honeysuckle, silky dogwood.	Autumn-olive	Norway spruce, green ash.	Eastern white pine, red pine, Douglas-fir.
107 Sawmill	---	Silky dogwood	Amur maple	Green ash, pin oak	---
112 Cowden	Gray dogwood, forsythia, Vanhoutte spirea.	American cranberrybush, silky dogwood, flowering dogwood, oriental arborvitae.	Amur maple, black spruce.	Tamarack, green ash, pin oak.	---
119D, 119D3, 119E3 Elco	Silky dogwood	Forsythia	Amur maple, Russian-olive.	Norway spruce	Douglas-fir, eastern white pine, red pine.
131C, 131D, 131E2 Alvin	European privet	Amur honeysuckle, lilac, autumn-olive, forsythia.	Russian-olive, eastern redcedar.	Eastern white pine, red pine, yellow-poplar, Norway spruce, green ash.	---
134A, 134B, 134C2, 134D3 Camden	---	Autumn-olive, Amur honeysuckle, American cranberrybush.	Eastern hemlock, eastern redcedar, flowering dogwood.	Norway spruce, Douglas-fir, eastern white pine, red pine.	Eastern cottonwood, silver maple.
138 Shiloh	Gray dogwood, forsythia.	Silky dogwood	Flowering dogwood, baldcypress.	Green ash, pin oak.	Eastern cottonwood.
198 Elburn	Silky dogwood	Autumn-olive	Amur maple, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
199A, 199B Plano	Gray dogwood	Autumn-olive, Amur honeysuckle.	Eastern redcedar, Russian-olive.	Eastern white pine, red pine, Norway spruce, Douglas-fir.	---
208 Sexton	Gray dogwood	Flowering dogwood, American cranberrybush, silky dogwood, forsythia.	Oriental arborvitae, Amur maple, baldcypress.	Pin oak, tamarack, black spruce, green ash.	---
212D3 Thebes	---	Gray dogwood	Russian-olive, Amur maple.	---	Eastern white pine, red pine, Douglas-fir, Norway spruce.
242 Kendall	---	Amur maple, gray dogwood, Russian-olive.	---	Eastern white pine, red pine, Douglas-fir.	Norway spruce, white spruce.
244 Hartsburg	Silky dogwood, forsythia, Vanhoutte spirea.	Amur maple, American cranberrybush, green ash.	Black spruce, flowering dogwood.	European larch, tamarack, pin oak.	---
249 Edinburg	Vanhoutte spirea.	Amur maple, silky dogwood, American cranberrybush, forsythia.	Flowering dogwood.	Black spruce, tamarack, green ash, pin oak, European larch.	---

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
259C, 259D2: Assumption	---	Late lilac, autumn-olive, Amur honeysuckle.	Russian-olive	---	Eastern white pine, red pine, Norway spruce, Douglas-fir.
280B, 280C2, 280D2, 280D3: Fayette	Redosier dogwood, gray dogwood.	Tatarian honeysuckle, bloodtwig dogwood, Siberian dogwood.	Amur maple, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, silver maple.
284: Tice	American cranberrybush.	Silky dogwood, autumn-olive, forsythia.	Amur maple, flowering dogwood.	Russian-olive, green ash.	Pin oak.
451: Lawson	---	Northern white-cedar, redosier dogwood, nannyberry viburnum.	Green ash, white spruce.	Eastern white pine, jack pine, silver maple.	---
533. Urban land					
551F. Gosport					
567C, 567D2: Elkhart	Gray dogwood, Vanhoutte spirea.	Amur honeysuckle, autumn-olive, late lilac, forsythia.	Russian-olive, Amur maple.	---	Eastern white pine, red pine, Norway spruce, Douglas-fir.
684B, 684C2: Broadwell	Vanhoutte spirea	Amur maple, gray dogwood, forsythia, silky dogwood, late lilac.	Autumn-olive, Russian-olive.	Douglas-fir, eastern white pine, red pine.	Norway spruce.
685B, 685C2: Middletown	Gray dogwood	Amur maple, silky dogwood, forsythia, Amur honeysuckle.	Russian-olive, flowering dogwood.	Douglas-fir, white spruce, eastern white pine, red pine.	Norway spruce.
801*. Orthents					
862, 864. Pits and Quarry					
2036B*: Urban land.					
Tama	Redosier dogwood, gray dogwood.	Siberian dogwood, bloodtwig dogwood, Tatarian honeysuckle.	Eastern redcedar, Amur maple.	Red pine, Norway spruce, Austrian pine.	Silver maple, eastern cottonwood.
2043*: Urban land.					
Ipava	Mockorange	European burningbush, late lilac, Amur honeysuckle, American cranberrybush, autumn-olive.	Eastern hemlock, green ash.	Douglas-fir, Norway spruce.	Eastern white pine, honeylocust.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2068*: Urban land.					
Sable	Gray dogwood, dwarf purple willow.	Silky dogwood, Amur honeysuckle, redosier dogwood, Amur maple.	Northern white-cedar, tall purple willow, medium purple willow.	Pin oak, green ash	Lombardy poplar.
2119D*: Urban land.					
Elco	Silky dogwood	Forsythia	Amur maple, Russian-olive.	Norway spruce	Douglas-fir, eastern white pine, red pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
8D3 Hickory	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey, slope.
8E Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
8E3 Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.
8F Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17 Keomah	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Slight	Slight.
19C2 Sylvan	Slight	Slight	Severe: slope.	Slight	Slight.
19D Sylvan	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
19D3 Sylvan	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey, slope.
19E3 Sylvan	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.
36A Tama	Slight	Slight	Slight	Slight	Slight.
36B Tama	Slight	Slight	Moderate: slope.	Slight	Slight.
36C2 Tama	Slight	Slight	Severe: slope.	Slight	Slight.
36D2 Tama	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
43 Ipava	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
45 Denny	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
50 Virden	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
67 Harpster	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
68 Sable	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
73 Ross	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.	Severe: floods.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
74 Radford	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
77 Huntsville	Severe: floods.	Slight	Moderate: floods.	Slight	Moderate: floods.
107 Sawmill	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
112 Cowden	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
119D Elco	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
119D3 Elco	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: slope, too clayey.
119E3 Elco	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.
131C Alvin	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy.
131D Alvin	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
131E2 Alvin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, slope.	Severe: slope.
134A Camden	Slight	Slight	Slight	Slight	Slight.
134B, 134C2 Camden	Slight	Slight	Moderate: slope.	Slight	Slight.
134D3 Camden	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
138 Shiloh	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
198 Elburn	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
199A Plano	Slight	Slight	Slight	Slight	Slight.
199B Plano	Slight	Slight	Moderate: slope.	Slight	Slight.
208 Sexton	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
212D3 Thebes	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey, slope.
242 Kendall	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
244 Hartsburg	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
249 Edinburg	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
259C Assumption	Moderate: percs slowly.	Slight	Severe: slope.	Slight	Slight.
259D2 Assumption	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
280B Fayette	Slight	Slight	Moderate: slope.	Slight	Slight.
280C2 Fayette	Slight	Slight	Severe: slope.	Slight	Slight.
280D2 Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
280D3 Fayette	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey, slope.
284 Tice	Severe: floods, wetness.	Moderate: wetness, too clayey.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: too clayey, wetness.
451 Lawson	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
533. Urban land					
551F Gosport	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.
567C Elkhart	Slight	Slight	Severe: slope.	Slight	Slight.
567D2 Elkhart	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
684B Broadwell	Slight	Slight	Moderate: slope.	Slight	Slight.
684C2 Broadwell	Slight	Slight	Severe: slope.	Slight	Slight.
685B Middletown	Slight	Slight	Moderate: slope.	Slight	Slight.
685C2 Middletown	Slight	Slight	Severe: slope.	Slight	Slight.
801*. Orthents					
862, 864. Pits and Quarry					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
2036B*:					
Urban land.					
Tama	Slight	Slight	Moderate: slope.	Slight	Slight.
2043*:					
Urban land.					
Ipava	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
2068*:					
Urban land.					
Sable	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
2119D*:					
Urban land.					
Elco	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
8D3---------------- Hickory	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
8E, 8E3------------ Hickory	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
8F----------------- Hickory	Very poor	Poor	Good	Good	Very poor	Very poor	Poor	Good	Very poor.
17----------------- Keomah	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair.
19C2, 19D, 19D3---- Sylvan	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
19E3--------------- Sylvan	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
36A, 36B----------- Tama	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
36C2, 36D2--------- Tama	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
43----------------- Ipava	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
45----------------- Denny	Good	Good	Good	Fair	Good	Good	Good	Fair	Good.
50----------------- Virden	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
67----------------- Harpster	Good	Good	Good	Fair	Good	Good	Good	Fair	Good.
68----------------- Sable	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
73----------------- Ross	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
74----------------- Radford	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
77----------------- Huntsville	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
107---------------- Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Poor.
112---------------- Cowden	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
119D, 119D3-------- Elco	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
119E3-------------- Elco	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
131C, 131D--------- Alvin	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
131E2: Alvin	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
134A, 134B: Camden	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
134C2: Camden	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
134D3: Camden	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
138: Shiloh	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
198: Elburn	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
199A, 199B: Plano	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
208: Sexton	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
212D3: Thebes	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
242: Kendall	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
244: Hartsburg	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
249: Edinburg	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
259C, 259D2: Assumption	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
280B: Fayette	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
280C2, 280D2, 280D3: Fayette	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
284: Tice	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
451: Lawson	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
533. Urban land									
551F: Gosport	Very poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
567C, 567D2: Elkhart	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
684B, 684C2: Broadwell	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
685B: Middletown	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
685C2-------------- Middletown	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
801*. Orthents									
862, 864. Pits and Quarry									
2036B*: Urban land.									
Tama--------------	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
2043*: Urban land.									
Ipava-------------	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
2068*: Urban land.									
Sable-------------	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
2119D*: Urban land.									
Elco--------------	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
8D3---------------- Hickory	Moderate: too clayey, slope.	Moderate: shrink-swell, low strength, slope.	Moderate: shrink-swell, low strength, slope.	Severe: slope.	Severe: low strength.	Moderate: too clayey, slope.
8E, 8E3, 8F-------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
17----------------- Keomah	Moderate: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, wetness, low strength.	Severe: shrink-swell, frost action, low strength.	Slight.
19C2--------------- Sylvan	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: shrink-swell, slope, low strength.	Severe: frost action, low strength.	Slight.
19D---------------- Sylvan	Moderate: slope.	Moderate: shrink-swell, slope, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
19D3--------------- Sylvan	Moderate: slope.	Moderate: shrink-swell, slope, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: slope.	Severe: frost action, low strength.	Moderate: too clayey, slope.
19E3--------------- Sylvan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
36A, 36B---------- Tama	Slight---------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
36C2--------------- Tama	Slight---------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
36D2--------------- Tama	Moderate: slope.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
43----------------- Ipava	Severe: wetness.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: frost action, wetness, low strength.	Moderate: wetness.
45----------------- Denny	Severe: wetness, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, low strength, floods.	Severe: wetness.
50----------------- Virden	Severe: wetness, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, low strength, floods.	Severe: wetness.
67----------------- Harpster	Severe: wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: wetness, frost action, low strength.	Severe: wetness.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
68---------------- Sable	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness.
73---------------- Ross	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength, floods.	Severe: floods.
74---------------- Radford	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, floods, frost action.	Moderate: wetness, floods.
77---------------- Huntsville	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action.	Moderate: floods.
107--------------- Sawmill	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
112--------------- Cowden	Severe: wetness.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, shrink-swell, low strength.	Severe: wetness, low strength, frost action.	Moderate: wetness.
119D-------------- Elco	Moderate: slope, wetness.	Moderate: slope, shrink-swell, low strength.	Moderate: shrink-swell, slope, wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
119D3------------- Elco	Moderate: slope, wetness.	Moderate: slope, shrink-swell, low strength.	Moderate: shrink-swell, slope, wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: too clayey, slope.
119E3------------- Elco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action, low strength.	Severe: slope.
131C-------------- Alvin	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: too sandy.
131D-------------- Alvin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: too sandy, slope.
131E2------------- Alvin	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
134A, 134B-------- Camden	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
134C2------------- Camden	Slight---------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: frost action, low strength.	Slight.
134D3------------- Camden	Moderate: slope.	Moderate: shrink-swell, slope, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
138--------------- Shiloh	Severe: wetness, floods.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: floods, shrink-swell, wetness.	Severe: wetness, low strength, floods.	Severe: wetness, floods.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
198 Elburn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
199A, 199B Plano	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
208 Sexton	Severe: wetness.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, low strength, frost action.	Severe: wetness.
212D3 Thebes	Severe: cutbanks cave.	Moderate: shrink-swell, slope, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength, frost action.	Moderate: too clayey, slope.
242 Kendall	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
244 Hartsburg	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, low strength.	Severe: wetness.
249 Edinburg	Severe: wetness, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: low strength, wetness, floods.	Severe: wetness.
259C Assumption	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
259D2 Assumption	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, shrink-swell, wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
280B Fayette	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
280C2 Fayette	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
280D2 Fayette	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
280D3 Fayette	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: too clayey, slope.
284 Tice	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, frost action.	Moderate: too clayey, wetness.
451 Lawson	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: frost action, low strength, floods.	Moderate: wetness, floods.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
533. Urban land						
551F: Gosport	Severe: slope, too clayey.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
567C: Elkhart	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
567D2: Elkhart	Moderate: slope.	Moderate: shrink-swell, slope, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
684B: Broadwell	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
684C2: Broadwell	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Severe: frost action, low strength.	Slight.
685B: Middletown	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
685C2: Middletown	Severe: cutbanks cave.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
801*. Orthents						
862, 864. Pits and Quarry						
2036B*: Urban land.						
Tama	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: shrink-swell, low strength.	Severe: frost action, low strength.	Slight.
2043*: Urban land.						
Ipava	Severe: wetness.	Severe: shrink-swell, low strength, wetness.	Severe: wetness, shrink-swell, low strength.	Severe: shrink-swell, low strength, wetness.	Severe: frost action, wetness, low strength.	Moderate: wetness.
2068*: Urban land.						
Sable	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness.
2119D*: Urban land.						

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2119D*:						
Elco	Moderate: slope, wetness.	Moderate: slope, shrink-swell, low strength.	Moderate: shrink-swell, slope, wetness.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
8D3 Hickory	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
8E, 8E3 Hickory	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
8F Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
17 Keomah	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
19C2 Sylvan	Slight	Severe: slope.	Slight	Slight	Good.
19D, 19D3 Sylvan	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
19E3 Sylvan	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
36A Tama	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
36B Tama	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
36C2 Tama	Slight	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
36D2 Tama	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
43 Ipava	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
45 Denny	Severe: floods, percs slowly, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Poor: wetness.
50 Virden	Severe: percs slowly, wetness, floods.	Severe: wetness.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: wetness, too clayey.
67 Harpster	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
68 Sable	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
73 Ross	Severe: floods.	Severe: floods, seepage.	Severe: floods, wetness, seepage.	Severe: floods, seepage.	Good.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
74: Radford	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
77: Huntsville	Severe: floods.	Moderate: seepage.	Severe: floods.	Severe: floods.	Good.
107: Sawmill	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
112: Cowden	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
119D, 119D3: Elco	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: slope, too clayey, wetness.
119E3: Elco	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: slope, wetness.	Poor: slope.
131C: Alvin	Slight	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Good.
131D: Alvin	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
131E2: Alvin	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
134A, 134B, 134C2: Camden	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
134D3: Camden	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
138: Shiloh	Severe: percs slowly, wetness, floods.	Severe: wetness.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
198: Elburn	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
199A: Plano	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
199B: Plano	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
208: Sexton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
212D3: Thebes	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Fair: too clayey, slope.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
242 Kendall	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
244 Hartsburg	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
249 Edinburg	Severe: percs slowly, wetness, floods.	Severe: wetness.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: wetness, too clayey.
259C Assumption	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: too clayey, wetness.	Slight	Fair: too clayey, wetness.
259D2 Assumption	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: too clayey, wetness.	Moderate: slope.	Fair: slope, too clayey, wetness.
280B Fayette	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
280C2 Fayette	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
280D2, 280D3 Fayette	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
284 Tice	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
451 Lawson	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
533. Urban land					
551F Gosport	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Severe: too clayey, slope, depth to rock.	Severe: slope.	Poor: too clayey, slope, area reclaim.
567C Elkhart	Slight	Severe: slope.	Slight	Slight	Good.
567D2 Elkhart	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
684B Broadwell	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey.
684C2 Broadwell	Slight	Severe: seepage, slope.	Severe: seepage.	Slight	Fair: too clayey.
685B Middletown	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
685C2 Middletown	Slight	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
801*. Orthents					
862, 864, Pits and Quarry					
2036B*: Urban land.					
Tama	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
2043*: Urban land.					
Ipava	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
2068*: Urban land.					
Sable	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
2119D*: Urban land.					
Elco	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: slope, too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
8D3: Hickory	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
8E, 8E3: Hickory	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
8F: Hickory	Poor: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
17: Keomah	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
19C2: Sylvan	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
19D: Sylvan	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
19D3: Sylvan	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
19E3: Sylvan	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
36A, 36B, 36C2: Tama	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
36D2: Tama	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
43: Ipava	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
45: Denny	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
50: Virden	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
67: Harpster	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
68: Sable	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
73: Ross	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Good.
74: Radford	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
77 Huntsville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
107 Sawmill	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
112 Cowden	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
119D Elco	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
119D3 Elco	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
119E3 Elco	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
131C Alvin	Fair: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy.
131D Alvin	Fair: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy, slope.
131E2 Alvin	Fair: slope, low strength.	Fair: excess fines.	Unsuited: excess fines.	Poor: slope.
134A, 134B, 134C2 Camden	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
134D3 Camden	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
138 Shiloh	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
198 Elburn	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
199A, 199B Plano	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
208 Sexton	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
212D3 Thebes	Good	Good	Unsuited: excess fines.	Fair: too clayey, slope.
242 Kendall	Poor: low strength, wetness.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
244 Hartsburg	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
249: Edinburg	Poor: low strength, wetness, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
259C: Assumption	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
259D2: Assumption	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
280B, 280C2: Fayette	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
280D2: Fayette	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
280D3: Fayette	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
284: Tice	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
451: Lawson	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
533. Urban land				
551F: Gosport	Poor: shrink-swell, area reclaim, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
567C: Elkhart	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
567D2: Elkhart	Poor: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
684B, 684C2: Broadwell	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer.
685B, 685C2: Middletown	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Fair: thin layer.
801*. Orthents				
862, 864. Pits and Quarry				
2036B*: Urban land.				
Tama	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
2043*: Urban land.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
2043*:				
Ipava	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
2068*: Urban land.				
Sable	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
2119D*: Urban land.				
Elco	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
8D3, 8E, 8E3, 8F-- Hickory	Seepage, slope.	Favorable------	Not needed-----	Slope----------	Slope----------	Slope.
17---------------- Keomah	Favorable------	Wetness, hard to pack.	Frost action---	Wetness, erodes easily.	Not needed-----	Erodes easily.
19C2-------------- Sylvan	Seepage, slope.	Favorable------	Not needed-----	Erodes easily, slope.	Erodes easily	Erodes easily.
19D, 19D3, 19E3--- Sylvan	Seepage, slope.	Favorable------	Not needed-----	Erodes easily, slope.	Slope, erodes easily.	Slope, erodes easily.
36A--------------- Tama	Seepage--------	Favorable------	Not needed-----	Favorable------	Not needed-----	Erodes easily.
36B--------------- Tama	Seepage--------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
36C2-------------- Tama	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.
36D2-------------- Tama	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Erodes easily	Slope, erodes easily.
43---------------- Ipava	Favorable------	Wetness, hard to pack.	Frost action---	Wetness--------	Not needed-----	Wetness, erodes easily.
45---------------- Denny	Favorable------	Wetness--------	Percs slowly, floods, frost action.	Percs slowly, wetness, erodes easily.	Not needed-----	Wetness, erodes easily, percs slowly.
50---------------- Virden	Favorable------	Wetness, hard to pack.	Floods, frost action.	Wetness--------	Not needed-----	Wetness.
67---------------- Harpster	Seepage--------	Hard to pack, wetness.	Frost action, floods.	Wetness, floods.	Not needed-----	Wetness.
68---------------- Sable	Seepage--------	Wetness--------	Frost action, floods.	Wetness--------	Not needed-----	Wetness.
73---------------- Ross	Seepage--------	Piping---------	Not needed-----	Floods---------	Not needed-----	Favorable.
74---------------- Radford	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
77---------------- Huntsville	Seepage--------	Favorable------	Not needed-----	Floods---------	Not needed-----	Favorable.
107--------------- Sawmill	Favorable------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
112--------------- Cowden	Favorable------	Wetness, hard to pack.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Not needed-----	Wetness, erodes easily, percs slowly.
119D, 119D3, 119E3------------ Elco	Slope, seepage.	Wetness--------	Slope, frost action.	Erodes easily, wetness, slope.	Slope, wetness.	Slope, erodes easily.
131C-------------- Alvin	Seepage, slope.	Seepage--------	Not needed-----	Fast intake, soil blowing, slope.	Too sandy, soil blowing.	Favorable.
131D, 131E2------- Alvin	Seepage, slope.	Seepage--------	Not needed-----	Fast intake, soil blowing, slope.	Slope, too sandy, soil blowing.	Slope.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
134A-------------- Camden	Seepage--------	Piping---------	Not needed-----	Erodes easily	Not needed-----	Erodes easily.
134B, 134C2------- Camden	Seepage--------	Piping---------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
134D3------------- Camden	Seepage--------	Piping---------	Not needed-----	Slope, erodes easily.	Favorable------	Slope, erodes easily.
138--------------- Shiloh	Favorable------	Wetness, hard to pack.	Percs slowly, floods, frost action.	Wetness, percs slowly.	Not needed-----	Wetness, percs slowly.
198--------------- Elburn	Seepage--------	Wetness--------	Frost action---	Wetness--------	Not needed-----	Wetness, erodes easily.
199A-------------- Plano	Seepage--------	Favorable------	Not needed-----	Favorable------	Not needed-----	Erodes easily.
199B-------------- Plano	Seepage--------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
208--------------- Sexton	Favorable------	Wetness--------	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Not needed-----	Wetness, erodes easily, percs slowly.
212D3------------- Thebes	Slope, seepage.	Piping, seepage.	Not needed-----	Slope, erodes easily.	Slope, too sandy.	Slope, erodes easily.
242--------------- Kendall	Seepage--------	Wetness--------	Frost action---	Wetness, erodes easily.	Not needed-----	Wetness, erodes easily.
244--------------- Hartsburg	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
249--------------- Edinburg	Favorable------	Hard to pack, wetness.	Percs slowly, floods, frost action.	Wetness, percs slowly, erodes easily.	Not needed-----	Wetness, erodes easily, percs slowly.
259C-------------- Assumption	Slope----------	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.
259D2------------- Assumption	Slope----------	Favorable------	Not needed-----	Slope----------	Slope, erodes easily.	Slope, erodes easily.
280B-------------- Fayette	Seepage--------	Favorable------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
280C2------------- Fayette	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Favorable------	Erodes easily.
280D2, 280D3------ Fayette	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Favorable------	Slope, erodes easily.
284--------------- Tice	Seepage--------	Wetness--------	Frost action---	Wetness--------	Not needed-----	Wetness.
451--------------- Lawson	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
533. Urban land						
551F-------------- Gosport	Slope, depth to rock.	Thin layer, hard to pack.	Not needed-----	Percs slowly, rooting depth, slope.	Slope, erodes easily, depth to rock.	Slope, erodes easily, depth to rock.
567C-------------- Elkhart	Seepage, slope.	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
567D2 Elkhart	Seepage, slope.	Favorable	Not needed	Slope	Slope, erodes easily.	Slope, erodes easily.
684B Broadwell	Seepage	Piping	Not needed	Favorable	Erodes easily	Erodes easily.
684C2 Broadwell	Seepage, slope.	Piping	Not needed	Slope	Erodes easily	Erodes easily.
685B Middletown	Seepage	Favorable	Not needed	Erodes easily	Favorable	Erodes easily.
685C2 Middletown	Seepage, slope.	Favorable	Not needed	Erodes easily, slope.	Favorable	Erodes easily.
801*. Orthents						
862, 864. Pits and Quarry						
2036B*: Urban land.						
Tama	Seepage	Favorable	Not needed	Favorable	Erodes easily	Erodes easily.
2043*: Urban land.						
Ipava	Favorable	Wetness, hard to pack.	Frost action	Wetness	Not needed	Wetness, erodes easily.
2068*: Urban land.						
Sable	Seepage	Wetness	Frost action, floods.	Wetness	Not needed	Wetness.
2119D*: Urban land.						
Elco	Slope, seepage.	Wetness	Slope, frost action.	Erodes easily, wetness, slope.	Slope, wetness.	Slope, erodes easily.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
8D3----------------- Hickory	0-6	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	6-35	Clay loam--------	CL	A-6, A-7	0-5	100	90-100	80-95	75-90	30-50	15-30
	35-70	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
8E------------------ Hickory	0-11	Silt loam--------	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	11-36	Clay loam--------	CL	A-6, A-7	0-5	100	90-100	80-95	75-90	30-50	15-30
	36-70	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
8E3----------------- Hickory	0-6	Clay loam--------	CL	A-6, A-7	0-5	95-100	90-100	80-95	75-90	30-50	15-30
	6-35	Clay loam--------	CL	A-6, A-7	0-5	100	90-100	80-95	75-90	30-50	15-30
	35-70	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
8F------------------ Hickory	0-11	Silt loam--------	CL-ML, CL	A-6, A-4	0-5	95-100	90-100	90-100	85-95	20-35	5-15
	11-36	Clay loam--------	CL	A-6, A-7	0-5	100	90-100	80-95	75-90	30-50	15-30
	36-70	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
17------------------ Keomah	0-12	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	12-47	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	100	95-100	45-60	30-45
	47-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-50	20-30
19C2---------------- Sylvan	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	7-29	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-50	20-30
	29-60	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	95-100	20-40	5-20
19D----------------- Sylvan	0-11	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	11-35	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-50	20-30
	35-60	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	95-100	20-40	5-20
19D3, 19E3---------- Sylvan	0-7	Silty clay loam	CL	A-7, A-6	0	100	100	100	95-100	35-50	20-30
	7-29	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-50	20-30
	29-60	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	95-100	20-40	5-20
36A----------------- Tama	0-17	Silt loam--------	ML, OL	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	17-46	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	46-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
36B, 36C2, 36D2----- Tama	0-9	Silt loam--------	ML, OL	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	9-44	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	44-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
43------------------ Ipava	0-16	Silt loam--------	ML, CL	A-4, A-6	0	100	100	95-100	90-100	30-40	6-16
	16-51	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	90-100	51-68	26-39
	51-63	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	30-40	11-19
45------------------ Denny	0-16	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	95-100	30-40	8-15
	16-56	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	95-100	35-60	15-35
	56-65	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	95-100	25-40	11-20
50------------------ Virden	0-15	Silty clay loam	CL	A-7, A-6	0	100	100	98-100	95-100	39-50	18-29
	15-48	Silty clay, silty clay loam.	CH, CL	A-7	0	100	100	98-100	95-100	45-70	27-48
	48-61	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	100	100	98-100	90-100	39-58	17-35

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
67----------------- Harpster	0-22	Silty clay loam	CL, CH	A-7	0	100	95-100	95-100	90-100	45-60	20-35
	22-44	Silty clay loam, silt loam, loam.	CL, CH	A-7	0	100	95-100	95-100	80-100	40-60	20-35
	44-60	Stratified sandy loam to clay loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-7	0	100	95-100	95-100	45-95	20-50	5-25
68----------------- Sable	0-19	Silty clay loam	CL, OH, CH, OL	A-7	0	100	100	98-100	95-100	41-65	15-35
	19-34	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	98-100	95-100	40-55	20-35
	34-60	Silt loam-------	CL	A-6	0	100	100	98-100	95-100	30-40	10-20
73----------------- Ross	0-35	Loam------------	ML, CL-ML, CL	A-4	0	90-100	90-100	80-100	65-95	20-35	NP-12
	35-60	Sandy loam------	SM SM-SC, SC	A-2-4, A-4	0-5	85-100	80-100	60-70	30-40	<30	NP-10
74----------------- Radford	0-32	Silt loam-------	ML, CL	A-4, A-6	0	100	100	95-100	80-100	30-40	5-15
	32-60	Silty clay loam, clay loam, loam.	CL	A-6, A-7	0	100	100	95-100	80-95	35-50	15-25
77----------------- Huntsville	0-51	Silt loam-------	CL, ML	A-6, A-7	0	100	98-100	90-100	80-100	35-50	10-25
	51-60	Loam, silt loam, sandy loam.	CL, ML, SM, SC	A-4, A-6	0	90-100	80-100	55-95	45-85	18-37	NP-15
107---------------- Sawmill	0-58	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	80-100	30-50	15-30
	58-65	Stratified silty clay loam to loam.	CL	A-6, A-7	0	100	100	95-100	70-100	25-45	10-30
112---------------- Cowden	0-18	Silt loam-------	CL-ML, CL	A-4	0	100	100	95-100	90-100	25-30	5-10
	18-50	Silty clay loam, silty clay.	CH	A-6, A-7	0	100	100	95-100	95-100	45-70	30-55
	50-68	Silt loam-------	CL	A-6, A-7	0	100	100	95-100	95-100	30-40	10-20
119D--------------- Elco	0-12	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	12-26	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	11-30
	26-60	Silty clay loam, loam, clay loam.	CL	A-7, A-6	0	100	90-100	80-100	60-95	25-50	11-30
119D3, 119E3------- Elco	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-100	30-45	15-30
	8-24	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	11-30
	24-70	Silty clay loam, loam, clay loam.	CL	A-7, A-6	0	100	90-100	80-100	60-95	25-50	11-30
131C, 131D, 131E2-- Alvin	0-9	Loamy sand------	SM	A-2	0	100	100	50-75	15-30	<20	NP-4
	9-32	Very fine sandy loam, sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	90-100	20-80	15-38	NP-13
	32-60	Stratified sandy loam to fine sand.	SM, SP, SP-SM	A-2, A-3	0-5	95-100	90-100	70-95	4-35	<20	NP-4

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
134A, 134B--------- Camden	0-13	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-35	5-15
	13-53	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	90-100	90-100	60-90	35-45	15-25
	53-60	Sandy loam, loam, silt loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	80-95	40-90	30-80	<35	NP-15
134C2------------- Camden	0-8	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-35	5-15
	8-45	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	90-100	90-100	60-90	35-45	15-25
	45-60	Sandy loam, loam, silt loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	80-95	40-90	30-80	<35	NP-15
134D3------------- Camden	0-8	Silty clay loam	CL	A-6	0	100	95-100	90-100	80-95	25-35	10-20
	8-45	Silty clay loam, clay loam.	CL	A-6, A-7	0	95-100	90-100	90-100	60-90	35-45	15-25
	45-60	Sandy loam, loam, silt loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	90-100	80-95	40-90	30-80	<35	NP-15
138--------------- Shiloh	0-18	Silty clay loam	CL, CH	A-7	0	100	100	98-100	90-100	43-55	20-32
	18-56	Silty clay, silty clay loam, clay.	CL, CH	A-7	0	100	100	98-100	90-100	41-56	19-34
	56-60	Silty clay loam, silty clay.	CL	A-7, A-6	0	100	100	95-100	90-100	36-47	18-29
198--------------- Elburn	0-15	Silt loam-------	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	15-53	Silty clay loam	CL	A-6, A-7	0	100	100	100	75-90	30-50	15-35
	53-60	Loam, sandy loam, clay loam.	CL, CL-ML, SC, SM-SC	A-6, A-4, A-2	0	90-100	80-100	60-90	25-80	20-40	5-20
199A, 199B--------- Plano	0-15	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	15-55	Silty clay loam	CL	A-6	0	100	100	95-100	95-100	25-40	10-25
	55-60	Stratified silt loam to loamy sand.	ML, SM, CL, SC	A-4, A-2	0-5	90-100	80-90	60-90	30-70	<25	NP-10
208--------------- Sexton	0-16	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	6-17
	16-54	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	15-28
	54-60	Stratified sandy loam to silty clay loam.	ML, CL, SM, SC	A-4, A-2, A-6	0	100	90-100	60-90	25-90	3-40	NP-25
212D3------------- Thebes	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	100	90-100	30-45	15-30
	8-33	Silty clay loam	CL	A-6, A-7	0	100	100	100	90-100	30-45	15-30
	33-37	Loam, sandy loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	100	100	90-100	40-70	15-30	NP-13
	37-60	Stratified silt loam to loamy sand.	SM, SM-SC	A-2-4	0	100	90-100	75-95	15-35	<25	NP-7
242--------------- Kendall	0-14	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	5-15
	14-54	Silty clay loam	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	54-60	Stratified sandy loam to clay loam.	CL, CL-ML, SM-SC, SC	A-2, A-4	0-5	90-100	80-90	60-90	30-70	<25	4-10
244--------------- Hartsburg	0-13	Silty clay loam	CH, CL	A-7, A-6	0	100	100	100	95-100	35-55	15-35
	13-32	Silty clay loam	CL, CH	A-7	0	100	100	95-100	95-100	40-55	25-35
	32-66	Silt loam-------	CL	A-6	0	95-100	90-100	90-100	85-100	25-40	11-20

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
249----------------- Edinburg	0-16	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	98-100	90-100	35-50	16-25
	16-55	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	98-100	90-100	45-70	28-50
	55-60	Silt loam, silty clay loam.	CL, CH	A-7	0	100	100	98-100	90-100	40-60	25-38
259C, 259D2-------- Assumption	0-12	Silt loam-------	CL	A-6, A-4	0	100	100	95-100	90-100	25-40	8-20
	12-30	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	30-60	Clay loam, silty clay loam.	CL	A-6, A-7	0-5	100	95-100	90-100	70-90	35-50	20-35
280B--------------- Fayette	0-11	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	11-53	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	53-70	Silt loam-------	CL	A-6	0	100	100	100	95-100	30-40	10-20
280C2, 280D2------- Fayette	0-8	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	8-50	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	50-60	Silt loam-------	CL	A-6	0	100	100	100	95-100	30-40	10-20
280D3-------------- Fayette	0-8	Silty clay loam	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
	8-50	Silty clay loam	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	50-60	Silt loam-------	CL	A-6	0	100	100	100	95-100	30-40	10-20
284---------------- Tice	0-8	Silty clay loam	CL	A-6, A-7	0	100	100	92-100	70-95	32-45	12-22
	8-60	Silty clay loam, loam.	CL	A-6, A-7	0	100	100	92-100	70-95	35-45	12-22
451---------------- Lawson	0-41	Silt loam-------	CL, CL-ML	A-4	0	100	100	90-100	80-100	20-30	5-10
	41-60	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-100	20-40	5-20
533. Urban land											
551F--------------- Gosport	0-13	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	13-30	Clay, silty clay, silty clay loam.	CH	A-7	0	90-100	90-100	85-100	85-100	50-65	35-50
	30-45	Weathered bedrock.									
567C, 567D2-------- Elkhart	0-14	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	14-29	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-50	18-30
	29-60	Silt loam, silt	CL, CL-ML	A-6, A-4	0	100	100	95-100	95-100	20-37	4-20
684B, 684C2-------- Broadwell	0-14	Silt loam-------	ML, CL	A-6, A-7, A-4	0	100	100	90-100	85-100	30-45	5-20
	14-55	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	30-45	10-25
	55-60	Loamy fine sand, fine sand.	SM, SP-SM, SP, SM-SC	A-3, A-2	0	100	100	75-95	4-35	<20	NP-5
685B, 685C2-------- Middletown	0-12	Silt loam-------	CL-ML, CL	A-4, A-6	0	00	100	100	90-100	25-40	5-15
	12-47	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-50	15-30
	47-60	Loamy fine sand, fine sand, sand.	SM, SP-SM, SC, SM-SC	A-4, A-2, A-3	0	100	90-100	75-95	5-40	<20	NP-10
801*. Orthents											
862, 864. Pits and Quarry											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
2036B*: Urban land.											
Tama--------------	0-9	Silt loam-------	ML, OL	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	9-44	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	44-68	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
2043*: Urban land.											
Ipava-------------	0-16	Silt loam-------	ML, CL	A-4, A-6	0	100	100	95-100	90-100	30-40	6-16
	16-51	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	90-100	51-68	26-39
	51-63	Silt loam-------	CL	A-6	0	100	100	95-100	90-100	30-40	11-19
2068*: Urban land.											
Sable-------------	0-19	Silty clay loam	CL, OH, CH, OL	A-7	0	100	100	98-100	95-100	41-65	15-35
	19-34	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	98-100	95-100	40-55	20-35
	34-60	Silt loam-------	CL	A-6	0	100	100	98-100	95-100	30-40	10-20
2119D*: Urban land.											
Elco--------------	0-12	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	12-26	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	11-30
	26-60	Silty clay loam, loam, clay loam.	CL	A-7, A-6	0	100	90-100	80-100	60-95	25-50	11-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	In/hr	In/in	pH				Pct
8D3--------------- Hickory	0-6	0.6-2.0	0.17-0.19	4.5-6.0	Moderate-------	0.32	4	.5-1
	6-35	0.6-2.0	0.15-0.19	4.5-5.5	Moderate-------	0.32		
	35-70	0.6-2.0	0.11-0.19	5.1-8.4	Low------------	0.32		
8E---------------- Hickory	0-11	0.6-2.0	0.20-0.22	4.5-6.0	Low------------	0.32	5	1-2
	11-36	0.6-2.0	0.15-0.19	4.5-5.5	Moderate-------	0.32		
	36-70	0.6-2.0	0.11-0.19	5.1-8.4	Low------------	0.32		
8E3--------------- Hickory	0-6	0.6-2.0	0.17-0.19	4.5-6.0	Moderate-------	0.32	4	.5-1
	6-35	0.6-2.0	0.15-0.19	4.5-5.5	Moderate-------	0.32		
	35-70	0.6-2.0	0.11-0.19	5.1-8.4	Low------------	0.32		
8F---------------- Hickory	0-11	0.6-2.0	0.20-0.22	4.5-6.0	Low------------	0.32	5	1-2
	11-36	0.6-2.0	0.15-0.19	4.5-5.5	Moderate-------	0.32		
	36-70	0.6-2.0	0.11-0.19	5.1-8.4	Low------------	0.32		
17---------------- Keomah	0-12	0.6-2.0	0.22-0.24	6.1-7.3	Low------------	0.37	5	1-2
	12-47	0.2-0.6	0.18-0.20	5.1-7.3	High-----------	0.37		
	47-60	0.2-0.6	0.18-0.20	5.1-8.4	High-----------	0.37		
19C2-------------- Sylvan	0-7	0.6-2.0	0.22-0.24	6.1-7.3	Low------------	0.37	5	1-2
	7-29	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.37		
	29-60	0.6-2.0	0.20-0.22	6.6-8.4	Moderate-------	0.37		
19D--------------- Sylvan	0-11	0.6-2.0	0.22-0.24	6.1-7.3	Low------------	0.37	5	1-2
	11-35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.37		
	35-60	0.6-2.0	0.20-0.22	6.6-8.4	Moderate-------	0.37		
19D3, 19E3-------- Sylvan	0-7	0.6-2.0	0.20-0.22	6.1-7.3	Moderate-------	0.37	4	.5-1
	7-29	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.37		
	29-60	0.6-2.0	0.20-0.22	6.6-8.4	Moderate-------	0.37		
36A--------------- Tama	0-17	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-------	0.32	5	2-4
	17-46	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	46-60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
36B, 36C2, 36D2--- Tama	0-9	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-------	0.32	5	2-4
	9-44	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	44-60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
43---------------- Ipava	0-16	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	4-5
	16-51	0.2-0.6	0.11-0.20	5.6-7.3	High-----------	0.43		
	51-63	0.2-0.6	0.20-0.22	6.1-7.8	Moderate-------	0.43		
45---------------- Denny	0-16	0.6-2.0	0.22-0.24	5.6-7.3	Low------------	0.37	3	3-4
	16-56	0.06-0.2	0.11-0.22	5.6-7.8	High-----------	0.37		
	56-65	0.2-0.6	0.20-0.22	6.1-8.4	Low------------	0.37		
50---------------- Virden	0-15	0.6-2.0	0.21-0.24	5.6-6.5	High-----------	0.28	5	4-6
	15-48	0.2-0.6	0.11-0.20	5.6-6.5	High-----------	0.28		
	48-61	0.2-0.6	0.18-0.22	6.6-8.4	High-----------	0.28		
67---------------- Harpster	0-22	0.6-2.0	0.21-0.24	7.4-8.4	Moderate-------	0.28	5	5-6
	22-44	0.6-2.0	0.17-0.22	7.4-8.4	Moderate-------	0.28		
	44-60	0.6-2.0	0.11-0.22	7.4-8.4	Low------------	0.28		
68---------------- Sable	0-19	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	5-6
	19-34	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-------	0.28		
	34-60	0.6-2.0	0.20-0.22	6.6-7.8	Low------------	0.28		
73---------------- Ross	0-35	0.6-2.0	0.18-0.22	6.1-7.8	Low------------	0.24	5	4-5
	35-60	0.6-2.0	0.11-0.13	6.1-7.8	Low------------	0.24		
74---------------- Radford	0-32	0.6-2.0	0.22-0.24	6.1-7.8	Low------------	0.28	5	2-3
	32-60	0.6-2.0	0.18-0.20	6.6-7.8	Moderate-------	0.28		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
77------------- Huntsville	0-51	0.6-2.0	0.22-0.24	6.1-7.3	Moderate-------	0.28	5	3-4
	51-60	0.6-2.0	0.12-0.21	6.1-7.8	Low------------	0.28		
107------------- Sawmill	0-58	0.6-2.0	0.18-0.23	6.1-7.8	Moderate-------	0.28	5	4-5
	58-65	0.6-2.0	0.11-0.20	7.4-8.4	Moderate-------	0.28		
112------------- Cowden	0-18	0.2-0.6	0.22-0.24	5.1-6.0	Low------------	0.37	3	2-3
	18-50	0.06-0.2	0.12-0.20	5.1-7.3	High-----------	0.37		
	50-68	0.2-0.6	0.17-0.22	5.6-7.8	Moderate-------	0.37		
119D------------ Elco	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low------------	0.37	4	1-2
	12-26	0.6-2.0	0.18-0.21	5.1-7.3	Moderate-------	0.37		
	26-60	0.2-0.6	0.14-0.20	5.1-7.3	Moderate-------	0.37		
119D3, 119E3----- Elco	0-8	0.6-2.0	0.18-0.21	5.6-7.3	Moderate-------	0.37	3	.5-1
	8-24	0.6-2.0	0.18-0.21	5.1-7.3	Moderate-------	0.37		
	24-70	0.2-0.6	0.14-0.20	5.1-7.3	Moderate-------	0.37		
131C, 131D, 131E2----------- Alvin	0-9	6.0-20	0.10-0.12	5.1-6.5	Low------------	0.17	5	.5-1
	9-32	0.6-2.0	0.12-0.20	4.5-6.0	Low------------	0.24		
	32-60	6.0-20	0.05-0.13	5.1-7.8	Low------------	0.24		
134A, 134B------- Camden	0-13	0.6-2.0	0.22-0.24	5.1-6.5	Low------------	0.37	5	1-2
	13-53	0.6-2.0	0.16-0.20	5.1-6.5	Moderate-------	0.37		
	53-60	0.6-2.0	0.12-0.18	5.6-7.3	Low------------	0.37		
134C2, 134D3----- Camden	0-8	0.6-2.0	0.22-0.24	5.1-6.5	Low------------	0.37	5-4	.5-2
	8-45	0.6-2.0	0.16-0.20	5.1-6.5	Moderate-------	0.37		
	45-60	0.6-2.0	0.12-0.18	5.6-7.3	Low------------	0.37		
138------------- Shiloh	0-18	0.2-0.6	0.12-0.21	6.1-7.3	High-----------	0.28	3	5-6
	18-56	0.06-0.2	0.09-0.18	6.6-7.8	High-----------	0.28		
	56-60	0.06-0.2	0.18-0.20	7.9-8.4	High-----------	0.28		
198------------- Elburn	0-15	0.6-2.0	0.22-0.24	5.6-7.8	Low------------	0.28	5	4-5
	15-53	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-------	0.43		
	53-60	0.6-2.0	0.12-0.18	6.1-8.4	Low------------	0.43		
199A, 199B------- Plano	0-15	0.6-2.0	0.22-0.24	6.1-7.3	Low------------	0.32	5	3-4
	15-55	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
	55-60	0.6-2.0	0.11-0.22	6.6-8.4	Low------------	0.43		
208------------- Sexton	0-16	0.2-0.6	0.22-0.24	5.6-6.5	Low------------	0.43	4	2-3
	16-54	0.06-0.2	0.18-0.20	5.1-6.0	High-----------	0.43		
	54-60	0.2-0.6	0.11-0.20	5.6-6.5	Low------------	0.43		
212D3----------- Thebes	0-8	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37	3	.5-1
	8-33	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		
	33-37	0.6-2.0	0.12-0.19	5.1-6.0	Low------------	0.37		
	37-60	2.0-6.0	0.05-0.10	5.1-6.5	Low------------	0.15		
242------------- Kendall	0-14	0.6-2.0	0.22-0.24	6.1-7.3	Low------------	0.37	5	1-2
	14-54	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		
	54-60	0.6-2.0	0.11-0.22	6.6-8.4	Low------------	0.37		
244------------- Hartsburg	0-13	0.6-2.0	0.21-0.24	6.1-7.3	Moderate-------	0.28	5	4-5
	13-32	0.6-2.0	0.18-0.20	6.6-8.4	Moderate-------	0.28		
	32-66	0.6-2.0	0.20-0.22	7.4-8.4	Low------------	0.28		
249------------- Edinburg	0-16	0.6-2.0	0.21-0.24	5.6-7.3	High-----------	0.37	4	2-3
	16-55	0.06-0.6	0.13-0.20	6.1-7.3	High-----------	0.37		
	55-60	0.2-2.0	0.18-0.22	6.6-7.8	High-----------	0.37		
259C, 259D2------ Assumption	0-12	0.6-2.0	0.22-0.24	5.6-6.5	Low------------	0.32	4-3	3-4
	12-30	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-------	0.43		
	30-60	0.2-0.6	0.14-0.20	5.1-6.5	Moderate-------	0.43		
280B------------ Fayette	0-11	0.6-2.0	0.20-0.22	5.1-7.3	Low------------	0.37	5	1-2
	11-53	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-------	0.37		
	53-70	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	In/hr	In/in	pH				Pct
280C2, 280D2----- Fayette	0-8	0.6-2.0	0.20-0.22	5.1-7.3	Low------------	0.37	5	1-2
	8-50	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-------	0.37		
	50-60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		
280D3------------ Fayette	0-8	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.37	4	.5-1
	8-50	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-------	0.37		
	50-60	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		
284-------------- Tice	0-8	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-------	0.32	5	2-3
	8-60	0.6-2.0	0.15-0.20	6.1-7.8	Moderate-------	0.32		
451-------------- Lawson	0-41	0.6-2.0	0.22-0.24	6.1-7.8	Low------------	0.28	5	4-5
	41-60	0.6-2.0	0.20-0.22	6.1-7.8	Low------------	0.28		
533. Urban land								
551F------------- Gosport	0-13	0.2-0.6	0.18-0.20	5.1-6.5	Low------------	0.43	3	1-2
	13-30	<0.06	0.12-0.14	3.6-5.0	High-----------	0.32		
	30-45	---	---	---	---------------	---		
567C, 567D2------ Elkhart	0-14	0.6-2.0	0.22-0.24	5.6-7.3	Low------------	0.32	5	2-3
	14-29	0.6-2.0	0.18-0.20	5.6-8.4	Moderate-------	0.43		
	29-60	0.6-2.0	0.20-0.22	7.4-8.4	Low------------	0.43		
684B, 684C2------ Broadwell	0-14	0.6-2.0	0.22-0.24	5.6-7.3	Low------------	0.32	5	3-4
	14-55	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
	55-60	6.0-20	0.05-0.09	6.1-6.5	Low------------	0.15		
685B, 685C2------ Middletown	0-12	0.6-2.0	0.22-0.24	6.1-7.3	Low------------	0.37	5	1-2
	12-47	0.6-2.0	0.18-0.21	4.5-6.5	Moderate-------	0.37		
	47-60	6.0-20	0.05-0.10	5.1-7.3	Low------------	0.17		
801*. Orthents								
862, 864. Pits and Quarry								
2036B*: Urban land.								
Tama------------	0-9	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-------	0.32	5	2-4
	9-44	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	44-68	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
2043*: Urban land.								
Ipava-----------	0-16	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	4-5
	16-51	0.2-0.6	0.11-0.20	5.6-7.3	High-----------	0.43		
	51-63	0.2-0.6	0.20-0.22	6.1-7.8	Moderate-------	0.43		
2068*: Urban land.								
Sable-----------	0-19	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	5-6
	19-34	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-------	0.28		
	34-60	0.6-2.0	0.20-0.22	6.6-7.8	Low------------	0.28		
2119D*: Urban land.								
Elco------------	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low------------	0.37	4	1-2
	12-26	0.6-2.0	0.18-0.21	5.1-7.3	Moderate-------	0.37		
	26-60	0.2-0.6	0.14-0.20	5.1-7.3	Moderate-------	0.37		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched," are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
8D3, 8E, 8E3, 8F-- Hickory	C	None--------	---	---	>6.0	---	---	>60	Moderate----	Moderate	Moderate.
17--------------- Keomah	C	None--------	---	---	2.0-4.0	Apparent	Apr-Jul	>60	High--------	High-----	Moderate.
19C2, 19D, 19D3, 19E3----------- Sylvan	B	None--------	---	---	>6.0	---	---	>60	High--------	Moderate	Moderate.
36A, 36B, 36C2, 36D2----------- Tama	B	None--------	---	---	>6.0	---	---	>60	High--------	Moderate	Moderate.
43--------------- Ipava	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	High--------	High-----	Moderate.
45--------------- Denny	D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High--------	High-----	Moderate.
50--------------- Virden	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High--------	High-----	Moderate.
67--------------- Harpster	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Feb-Jun	>60	High--------	High-----	Low.
68--------------- Sable	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High--------	High-----	Low.
73--------------- Ross	B	Common------	Very brief	Nov-Jun	>0.6	---	---	>60	Moderate----	Low------	Low.
74--------------- Radford	B	Common------	Brief-----	Mar-Jun	1.0-3.0	Apparent	Mar-Jun	>60	High--------	High-----	Low.
77--------------- Huntsville	B	Occasional	Brief-----	Apr-Jun	>6.0	---	---	>60	High--------	Low------	Low.
107-------------- Sawmill	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High--------	High-----	Low.
112-------------- Cowden	D	None--------	---	---	0-1.0	Apparent	Mar-Jun	>60	High--------	High-----	Moderate.
119D, 119D3, 119E3----------- Elco	B	None--------	---	---	3.0-5.0	Apparent	Mar-May	>60	High--------	High-----	Moderate.
131C, 131D, 131E2- Alvin	B	None--------	---	---	>6.0	---	---	>60	Moderate----	Low------	High.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
134A, 134B, 134C2, 134D3------------ Camden	B	None---------	---	---	>6.0	---	---	>60	High---------	Low------	Moderate.
138--------------- Shiloh	B/D	Frequent----	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High---------	High-----	Low.
198--------------- Elburn	B	None---------	---	---	1.0-3.0	Apparent	Jan-May	>60	High---------	High-----	Moderate.
199A, 199B-------- Plano	B	None---------	---	---	>6.0	---	---	>60	High---------	Moderate	Low.
208--------------- Sexton	C/D	Rare---------	---	---	0-2.0	Apparent	Mar-Jun	>60	High---------	High-----	Moderate.
212D3------------- Thebes	B	None---------	---	---	>6.0	---	---	>60	High---------	Moderate	High.
242--------------- Kendall	B	None---------	---	---	1.0-2.0	Apparent	Mar-Jun	>60	High---------	High-----	Moderate.
244--------------- Hartsburg	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High---------	High-----	Low.
249--------------- Edinburg	C	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High---------	High-----	Moderate.
259C, 259D2------- Assumption	B	None---------	---	---	3.0-4.5	Perched	Feb-May	>60	High---------	High-----	Moderate.
280B, 280C2, 280D2, 280D3----- Fayette	B	None---------	---	---	>6.0	---	---	>60	High---------	Moderate	Moderate.
284--------------- Tice	C	Occasional	Brief-----	Mar-Jun	1.0-3.0	Apparent	Mar-Jun	>60	High---------	High-----	Low.
451--------------- Lawson	B	Occasional	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	High---------	Moderate	Low.
533. Urban land											
551F-------------- Gosport	D	None---------	---	---	>6.0	---	---	20-40	Moderate----	High-----	High.
567C, 567D2------- Elkhart	B	None---------	---	---	>6.0	---	---	>60	High---------	Moderate	Moderate.
684B, 684C2------- Broadwell	B	None---------	---	---	>6.0	---	---	>60	High---------	Moderate	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth		Uncoated steel	Concrete
					Ft			In			
685B, 685C2------- Middletown	B	None--------	---	---	>6.0	---	---	>60	High--------	High-----	High.
801*. Orthents											
862, 864. Pits and Quarry											
2036B*: Urban land.											
Tama-------------	B	None--------	---	---	>6.0	---	---	>60	High--------	Moderate	Moderate.
2043*: Urban land.											
Ipava------------	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	High--------	High-----	Moderate.
2068*: Urban land.											
Sable------------	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	High--------	High-----	Low.
2119D*: Urban land.											
Elco-------------	B	None--------	---	---	3.0-5.0	Apparent	Mar-May	>60	High--------	High-----	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

Soil name and location	Parent material	Report 569IL-	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Mechanical analysis, Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Mechanical analysis, Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Classification: Unified
			In	Lb/cu ft	Pct									Pct			
Alvin fine sandy loam: NE1/4SE1/4SW1/4 SW1/4 sec. 31, T. 15 N., R. 3 W. (Nonmodal)	Eolian sand---	83-2-1	0-8	119.6	10.1	100	100	94	29	27	10	6	4	---	NP	A-2-4 (0)	SP
		83-2-2	22-30	120.6	12.1	---	100	92	32	27	20	16	15	22.2	9.2	A-2-4 (0)	SP
		83-2-3	71-88	107.2	13.1	---	100	91	6	6	5	5	4	---	NP	A-3(0)	SP
Elco silt loam: 410 feet west and 400 feet north of center of sec. 35, T. 15 N., R. 4 W. (Modal)	20 to 40 inches of loess over buried paleosol.	83-9-1	0-4	94.8	21.6	100	100	99	94	85	57	15	9	35.8	8.8	A-4(8)	ML
		83-9-2	21-26	106.1	17.6	100	99	99	89	83	59	36	32	44.3	30.0	A-7-6 (17)	CL
		83-9-3	39-55	109.8	16.7	99	99	97	81	75	55	33	27	42.4	27.8	A-7-6 (16)	CL
		83-9-4	60-70	118.2	13.2	95	93	83	51	47	36	20	16	26.1	14.5	A-6(5)	CL
Fayette silt loam: NE1/4SE1/4NE1/4 SE1/4 on ridge-top, 33 feet west from break to east facing slope and 369 feet north from point where small drainageway enters larger drainageway. (Nonmodal)	Loess---------	83-1-1	0-4	95.4	21.6	100	100	99	95	89	60	17	9	32.7	6.5	A-4(8)	ML
		83-1-2	14-21	105.5	18.8	---	100	100	100	87	67	31	22	42.7	27.3	A-7-6 (15)	CL
		83-1-3	64-72	109.6	16.0	---	100	100	99	58	28	22	18	28.4	11.0	A-6(8)	CL
Hickory silt loam: 1,425 feet north and 450 feet east of the southwest corner of sec. 30, T. 15 N., R. 5 W. (Modal)	48 inches of loess over glacial till.	83-7-1	0-4	110.4	15.8	99	97	90	69	60	40	20	15	27.7	10.5	A-6(7)	CL
		83-7-2	11-17	99.6	21.5	98	95	90	68	64	58	42	38	58.4	44.5	A-7-6 (18)	CH
		83-7-3	62-70	124.0	12.2	97	93	86	57	50	38	26	20	27.3	16.6	A-6(7)	CL
Keomah silt loam: 246 feet west from center of road and 24 feet north from section line, in SE1/4SW1/4SE1/4 SE1/4 sec. 18, T. 15 N., R. 4 W. (Nonmodal)	Loess---------	83-3-1	0-8	104.0	17.5	---	100	98	96	89	60	23	15	29.3	7.9	A-4(8)	CL
		83-3-2	16-23	109.7	17.2	---	100	100	100	90	60	21	15	32.3	13.6	A-6(9)	CL
		83-3-3	56-65	108.6	16.6	100	100	99	99	92	55	16	12	26.3	5.8	A-4(8)	CL-ML

TABLE 17.--ENGINEERING TEST DATA--Continued

Soil name and location	Parent material	Report 569IL-	Depth	Moisture density: Maximum dry density	Moisture density: Optimum moisture	Mechanical analysis: Percentage passing sieve--: No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO	Unified
			In	Lb/cu ft	Pct									Pct			
Tama silt loam: 501 feet south and 76 feet west of center of sec. 1, T. 14 N., R. 4 W. (Modal)	Loess----------	83-10-1	0-9	103.8	18.3	100	100	100	99	87	67	32	26	36.6	17.2	A-6 (11)	CL
		83-10-2	20-26	95.7	23.0	---	100	100	99	94	72	40	32	51.8	30.3	A-7-6 (18)	CH
		83-10-3	57-68	95.8	23.0	---	100	99	98	77	72	53	37	58.8	40.1	A-7-6 (20)	CH

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Assumption	Fine-silty, mixed, mesic Typic Argiudolls
Broadwell	Fine-silty, mixed, mesic Typic Argiudolls
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
*Cowden	Fine, montmorillonitic, mesic Mollic Albaqualfs
Denny	Fine, montmorillonitic, mesic Mollic Albaqualfs
Edinburg	Fine, montmorillonitic, mesic Typic Argiaquolls
Elburn	Fine-silty, mixed, mesic Aquic Argiudolls
Elco	Fine-silty, mixed, mesic Typic Hapludalfs
Elkhart	Fine-silty, mixed, mesic Typic Argiudolls
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs
*Gosport	Fine, illitic, mesic Typic Dystrochrepts
Harpster	Fine-silty, mesic Typic Calciaquolls
Hartsburg	Fine-silty, mixed, mesic Typic Haplaquolls
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Huntsville	Fine-silty, mixed, mesic Cumulic Hapludolls
Ipava	Fine, montmorillonitic, mesic Aquic Argiudolls
Kendall	Fine-silty, mixed, mesic Aeric Ochraqualfs
Keomah	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Middletown	Fine-silty, mixed, mesic Typic Hapludalfs
Orthents	Fine-silty, mixed, nonacid, mesic Typic Udorthents
Plano	Fine-silty, mixed, mesic Typic Argiudolls
Radford	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Sable	Fine-silty, mixed, mesic Typic Haplaquolls
Sawmill	Fine-silty, mixed, mesic Cumulic Haplaquolls
Sexton	Fine, montmorillonitic, mesic Typic Ochraqualfs
Shiloh	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Sylvan	Fine-silty, mixed, mesic Typic Hapludalfs
Tama	Fine-silty, mixed, mesic Typic Argiudolls
Thebes	Fine-silty over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Tice	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Virden	Fine, montmorillonitic, mesic Typic Argiaquolls

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