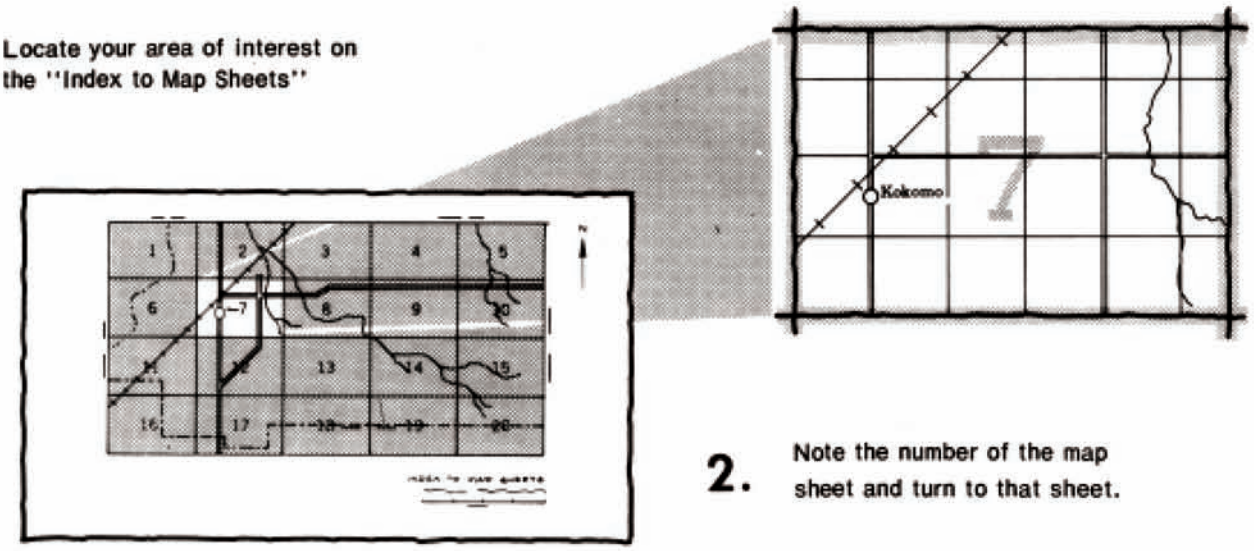
Soil Survey of OGLE COUNTY, ILLINOIS

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

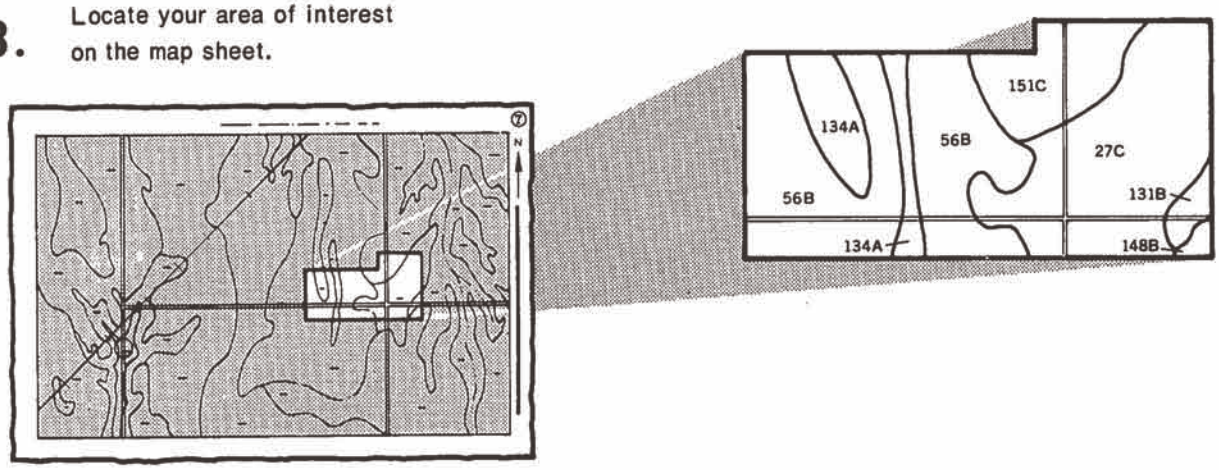
HOW TO USE

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

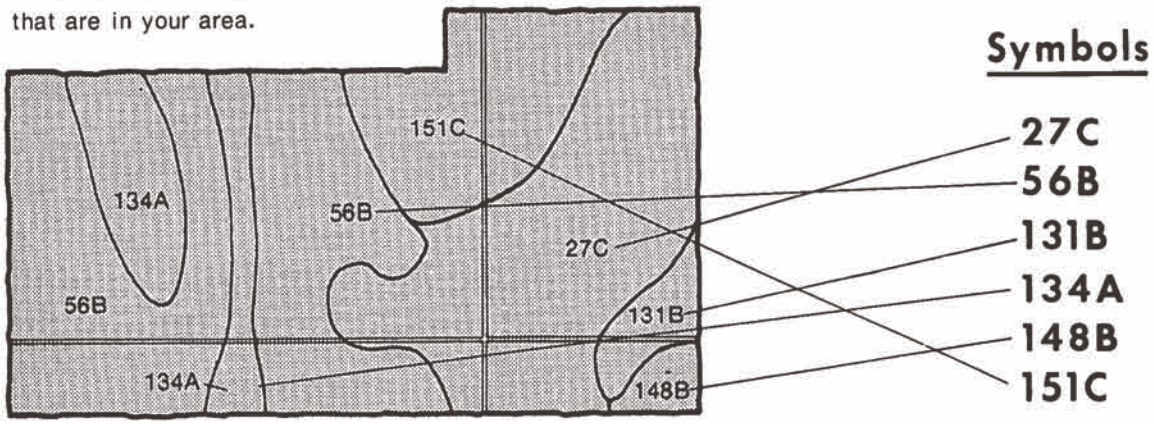


2. Note the number of the map sheet and turn to that sheet.

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

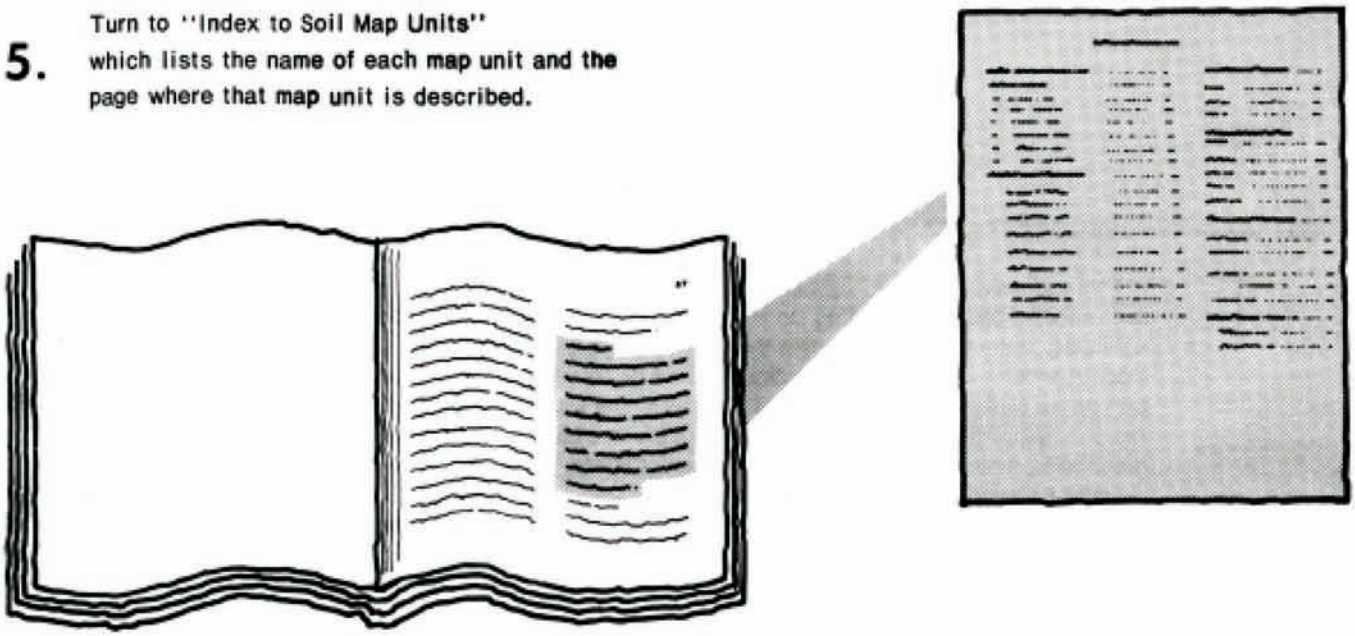


4. List the map unit symbols that are in your area.

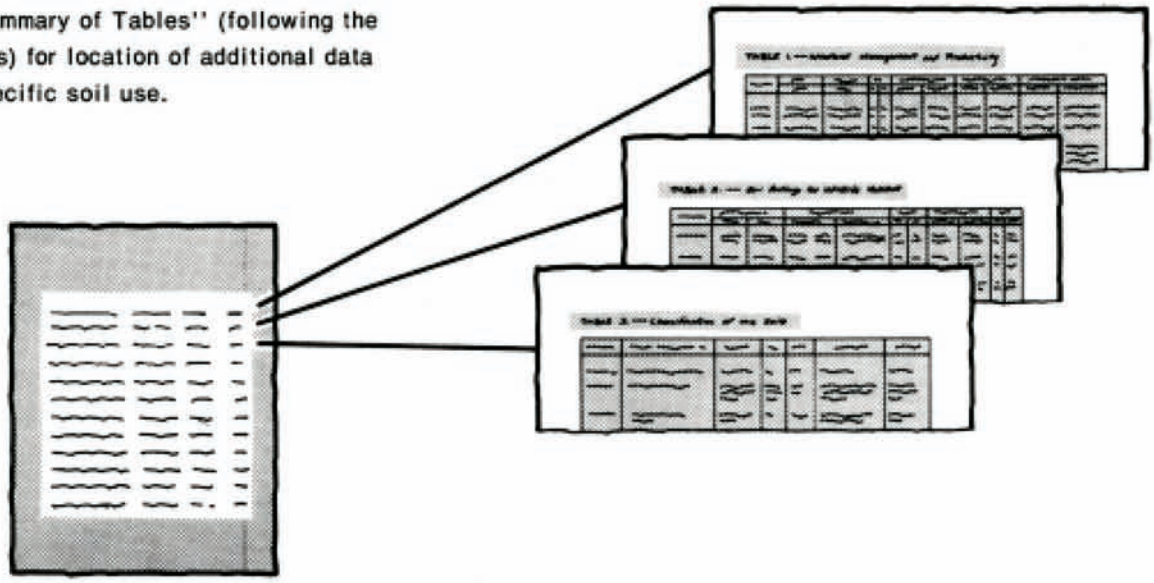


THIS SOIL SURVEY

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 is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. 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 completed in the period 1972 through 1977. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the 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. This soil survey is Illinois Agricultural Experiment Station Report No. 113. It is part of the technical assistance furnished to the Ogle Soil and Water Conservation District. The cost was shared by the Ogle County Board of Supervisors.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Typical area of Tama silt loam protected by parallel tile outlet terraces. This soil is suited to cultivated crops.

Contents

Contents—continued

Issued April 1980

Index to soil map units

Index to soil map units—continued

Summary of tables

Summary of tables—continued

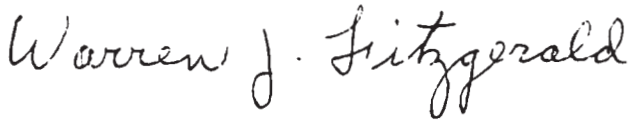
Foreword

This soil survey contains information that can be used in land-planning programs in Ogle 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.



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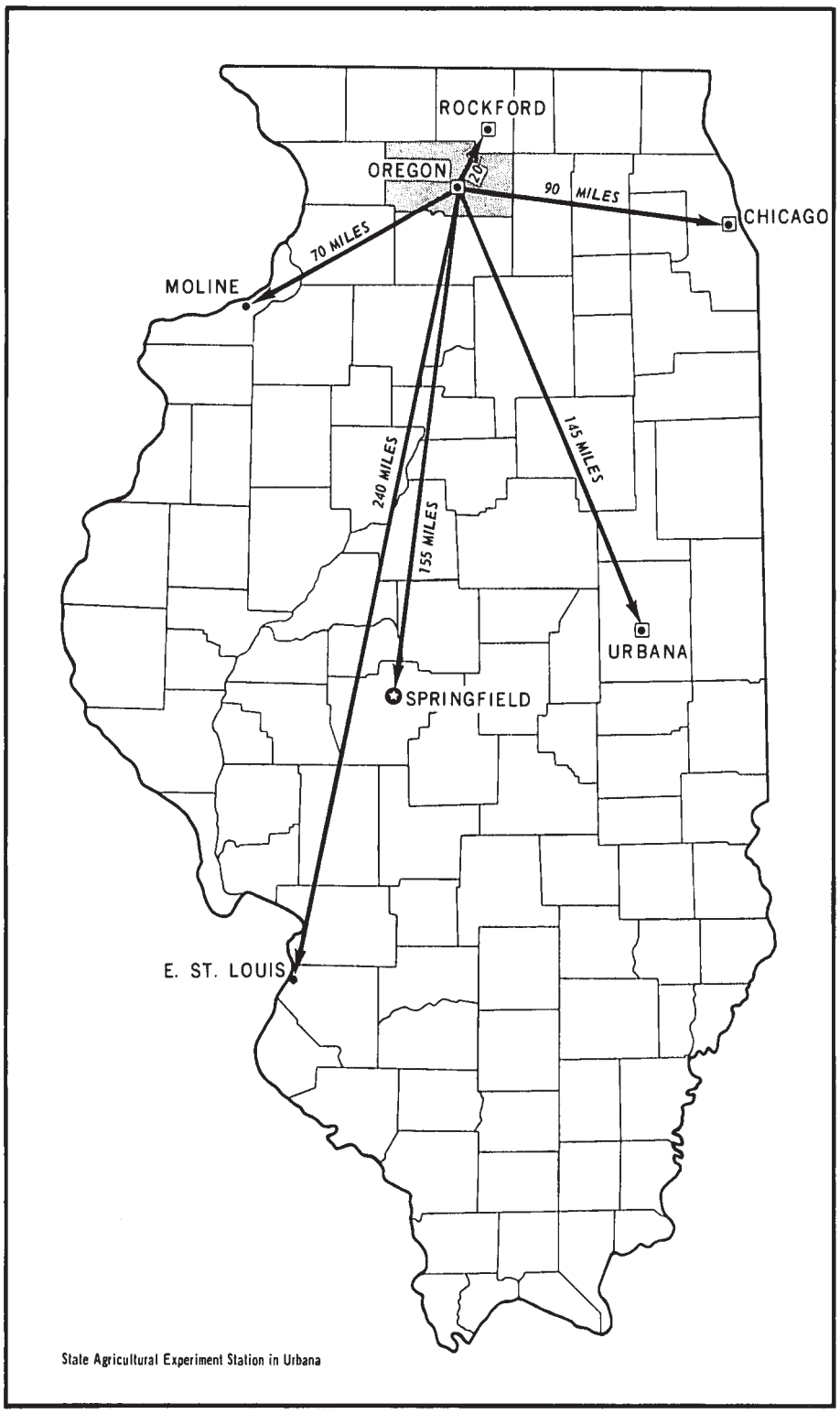

Location of Ogle County in Illinois.

SOIL SURVEY OF OGLE COUNTY, ILLINOIS

By Lawrence L. Acker, Mack S. Hodges, George T. Keller and Richard Rehner,
Soil Conservation Service

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

General nature of the county

Ogle County was established January 16, 1836, from a part of Jo Daviess County. It was once a part of the Northwest Territory. The name Ogle was suggested by Thomas Ford in memory of Captain Joseph Ogle, who distinguished himself for his courage and coolness in the early days of the state's history. The first session of the Ogle County Commissioner's Court was held at Oregon on January 3, 1837, and Oregon was chosen to be the county seat. In 1839, the county board ordered the town of Oregon to be called Florence; in 1843, however, it was renamed Oregon.

Because there was so much dissension, efforts were made to divide the county and, on February 27, 1839, the legislature approved an act creating Lee County, with Dixon as its county seat, out of the southern half of Ogle County.

Ogle County is located in the northwestern part of Illinois about 23 miles south of the Illinois-Wisconsin state line. The county is about 38 miles long at its greatest width (east-west). Ogle County comprises 25 townships that occupy 757 square miles, or 488,320 acres. It is the seventeenth largest county in the state. The population recorded in the 1970 Census was 42,867.

Because the topography of the county is mostly flat to rolling, about 89 percent of the land area is agricultural land.

Ogle County lies entirely within the Rock River drainage basin.

The Rock River flows on a southwesterly course through the center of Ogle County. Most of its tributaries flow into the Rock River within the boundaries of the county. Land west of the Rock River primarily is drained via Elkhorn Creek, Pine Creek, and Leaf River. Within Ogle County, Leaf River is the largest tributary to the Rock River. Land east of the Rock River primarily is drained via Kyte River, Stillman Creek, and Kilbuck Creek. Most of the streams in the county are characterized by moderate to fairly steep gradients.

Farming and industry

Agriculture is a major factor in the economy of Ogle County. Other important industries are printing and the canning of vegetable crops. Meat packing, production of electricity, recreation, lumber, textile manufacturing, and limestone and sand production are also important.

Lesser industries are either directly related to agriculture or indirectly dependent on agriculture.

Agriculture has been important in Ogle County throughout its history. The 1974 Census of Agriculture indicates there were 1,686 farms in the county comprising 440,954 acres—an average of 262 acres per farm. Of this acreage, 1,606 farms are listed as cropland farms of which 377,845 acres are directed to that use. The trend has been to fewer but larger farms. In 1964, for example, census figures indicate 1,887 farms have an average of 243 acres per farm. There are approximately 14,713 acres of pastureland and 30,800 acres of woodland in the county.

Corn is king in Ogle County. Of the 377,845 acres listed as cropland farms, some 200,000 acres are planted to corn annually. The second highest acreage is about 80,000 acres planted to soybeans. Vegetable crops such as sweet corn, lima beans, pumpkins, and peas, total about 50,000 acres with the remaining 47,845 acres in oats, hay, wheat, or other crops. The acreage of various crops grown varies with the prevailing economic conditions.

Livestock numbers on Ogle County farms as listed in the 1974 Census of Agriculture include 978 farms that market 80,296 head of cattle and calves annually, 268 dairy farms that have 8,088 head on farms, 595 swine farms that market 167,201 head annually, and 175 sheep farms that market 4,109 head annually. Other livestock includes horses and ponies and poultry. The trend is to use confinement feeding facilities that concentrate a greater number of cattle and hogs on fewer farms. The confinement systems being constructed, in

general, use labor more efficiently and are designed to handle livestock wastes with a minimum of pollution.

Parks and recreation

Although Ogle County is predominately agricultural, the variety of natural resources makes it ideal for park and recreational pursuits. The Rock River, running the entire breadth of the county, and the three state parks, Lowden, White Pines, Castle Rock, make this area particularly attractive to people outside of this area. In addition to state parks, there are numerous church camps and private campgrounds accessible to the public, all of which bring people into the area. Approximately 30 public recreational enterprises in Ogle County provide the following types of recreation: swimming, horseback riding, golfing, camping, fishing, dude ranching, rural zoo (domestic and wild animals), canoeing and boating.

Climate

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

Ogle County is cold in winter and is quite hot, with occasional cool spells, in summer. Precipitation during the winter frequently is in the form of snowstorms. When warm moist air moves in from the south during the warm months, it is chiefly showers, often heavy. Total annual rainfall is normally adequate for corn, soybeans, and small grains.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Rochelle 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 23 degrees F, and the average daily minimum temperature is 14 degrees. The lowest temperature on record, which occurred at Rochelle on January 23, 1963, is -24 degrees. In summer the average temperature is 71 degrees, and the average daily maximum temperature is 82 degrees. The highest recorded temperature, which occurred on July 1, 1956, is 100 degrees.

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

The total annual precipitation is 34 inches. Of this, 22 inches, or 65 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 19 inches. The heaviest 1-day rainfall during the period of record was 5.6 inches at Rochelle on October 10, 1954. Thunderstorms occur on about 40 days each year, and most occur in summer.

Average seasonal snowfall is 33 inches. The greatest snow depth at any one time during the period of record was 13 inches. On an average of 16 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 west-northwest. Average windspeed is highest, 11 miles per hour, in spring.

Tornadoes and severe thunderstorms strike occasionally. These storms are local and of short duration. They result in sparse damage in narrow belts. Hailstorms occur at times during the warmer part of the year in irregular patterns and in relatively small areas.

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.

Broad land-use considerations

The soils in Ogle County vary widely in their suitability for major land uses.

Most of the acreage in the county is used for cultivated crops, dominantly corn and soybeans. This cropland is scattered throughout the county, but it is concentrated largely in associations 1, 2, 3, 4, 5, 7, and 10. Associations 1, 2, 3, 4, 5, 6, and 7 are on nearly level to strongly sloping uplands; the hazard of erosion is the main limitation for crops. Tama, Plano, and Catlin soils are the most extensive soils. Associations 2 and 10 are flooded occasionally, principally in winter and early in spring, which causes slight to moderate crop damage. Wetness is the major limitation for crops. Drummer and Lawson soils are the main soils in associations 2 and 10.

A small amount of the acreage in the county is in pasture. Associations 1, 2, 3, 4, 5, 6, 7, 9, and 10 are suitable for grasses and legumes. The major soils in these associations are Tama, Fayette, Plano, Catlin, Downs, and Jasper soils on uplands and Drummer, Lawson, Selma, and Comfrey on flood plains.

A small amount of the acreage in the county is in woodland. All associations have good or excellent suitability for trees. Some of the soils have moderate or severe limitations for equipment, but these limitations can be overcome by harvesting during the drier seasons or by using special equipment.

A few areas of the county are urban developments. In general, areas of gently sloping to sloping Chelsea and Martinsville soils have the best suitability for urban uses. These soils are mainly in associations 8 and 9. In other associations low strength, frost action, wetness, and steep slopes are the principle soil limitations. Soils on flood plains, such as those in association 10, are poorly suited to urban development because of flooding. Sites that are suitable for houses or small commercial buildings, however, are generally available in many areas.

Suitability for recreation ranges from good to poor, depending on the intensity of expected use. Association 7 is well suited for intensive recreational development. Associations 2 and 10 are poorly suited because of flooding. The hilly to steep slopes within associations 8 and 9 limit suitability of the soils for intensive recreational development, such as playgrounds and camp areas. All of these associations, however, are suitable for extensive recreational uses, such as hiking or horseback riding. Small areas suitable for intensive recreational uses are available in associations that are generally poorly suited to recreational development.

Suitability for wildlife habitat is good throughout the county. All associations, except 8 and 10, are well suited to habitat for openland wildlife. The suitability for woodland wildlife habitat is good in associations 6, 7, 8, and 9. The soils on flood plains and outwash plains in associations 2 and 10 are well suited for habitat for wetland wildlife. The Comfrey soils are especially suitable for shallow water areas for waterfowl.

Descriptions and potentials of soil associations

Areas dominated by silty and loamy soils that formed in loess, glacial till, and outwash on uplands and in upland depressions

These soils are dominantly nearly level to strongly sloping, but some soils on outwash plains are level. The most extensive problem is soil erosion. Drainage is also a concern on some soils.

1. Saybrook-Drummer-Flanagan association

Nearly level to sloping, moderately well drained to poorly drained soils that formed in loess over glacial till or in loess over outwash

This soil association consists of soils in upland depressions and on knolls and side slopes. It makes up about 6 percent of the county. It is about 20 percent Saybrook soils, 20 percent Drummer soils, 9 percent Flanagan soils, and 51 percent soils of minor extent (fig. 1).

Saybrook soils are moderately well drained. These nearly level to sloping soils are on uplands, mainly on ridgetops and valley side slopes. They typically have a surface layer of very dark gray and very dark grayish brown silt loam about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown silt loam about 3 inches thick. The subsoil is about 23 inches

thick. The upper part is brown silty clay loam, the middle part is grayish brown silty clay loam, and the lower part is yellowish brown loam. The substratum, to a depth of 60 inches, is brown, calcareous loam.

Drummer soils are poorly drained. These nearly level soils are mainly in low lying areas and depressions on till and outwash plains. The surface layer is black silty clay loam about 8 inches thick. The subsurface layer is black and dark gray silty clay loam about 4 inches thick. The subsoil is about 35 inches thick. The upper part is dark gray silty clay loam, the middle part is olive gray silty clay loam, and the lower part is olive gray silty loam. The substratum is mixed, olive gray and yellowish brown loam and silt loam to a depth of 60 inches.

Flanagan soils are somewhat poorly drained. These nearly level to gently sloping soils are on uplands, mainly on convex side slopes and along drainageways. The surface layer is black silt loam about 8 inches thick. The subsurface layer is very dark gray silty clay loam about 4 inches thick. The subsoil is silty clay loam about 40 inches thick. The upper part is mottled, dark grayish brown, and friable; the middle part is mottled grayish brown; and the lower part is mottled dark yellowish brown, yellowish brown, and greenish gray. The substratum, to a depth of 65 inches, is calcareous silty clay loam till that is mottled yellowish brown, dark yellowish brown, and greenish gray.

Of minor extent, are La Rose, Catlin, Elburn, Jasper, Parr, and Comfrey soils. La Rose soils are well drained and moderately sloping. These soils are on side slopes on uplands. The moderately well drained, nearly level to sloping Catlin soils are on uplands on convex side slopes. They are mapped with Saybrook soils. The somewhat poorly drained, nearly level to gently sloping Elburn soils are on stream terraces and gentle side slopes on uplands. The well drained, nearly level to sloping Jasper soils are on outwash plains. The well drained, nearly level to sloping Parr soils are on uplands, mainly on ridgetops and side slopes of till plains. The poorly drained, nearly level Comfrey soils are on bottom lands of rivers, streams, and drainageways.

The soils in this association are used for cultivated crops. Corn and soybeans are the main crops. Small grain, hay, and some specialty crops are also grown. Beef cattle is the main livestock enterprise. Erosion control on sloping soils and drainage of nearly level and low lying soils are the main concerns of management.

This association is moderately to poorly suited to dwellings and septic tank absorption fields because it is wet and shrinks and swells. Some areas of Drummer soils receive runoff from adjacent soils.

2. Drummer-Selma-Canisteo association

Nearly level, poorly drained soils that formed in loess over outwash material or in loamy material over outwash

This soil association consists of soils on broad flats and in depressions on outwash plains. It makes up about 6 percent of the county. It is about 40 percent Drummer soils, 27 percent Selma soils, 13 percent Canisteo soils, and 20 percent soils of minor extent (fig. 2).

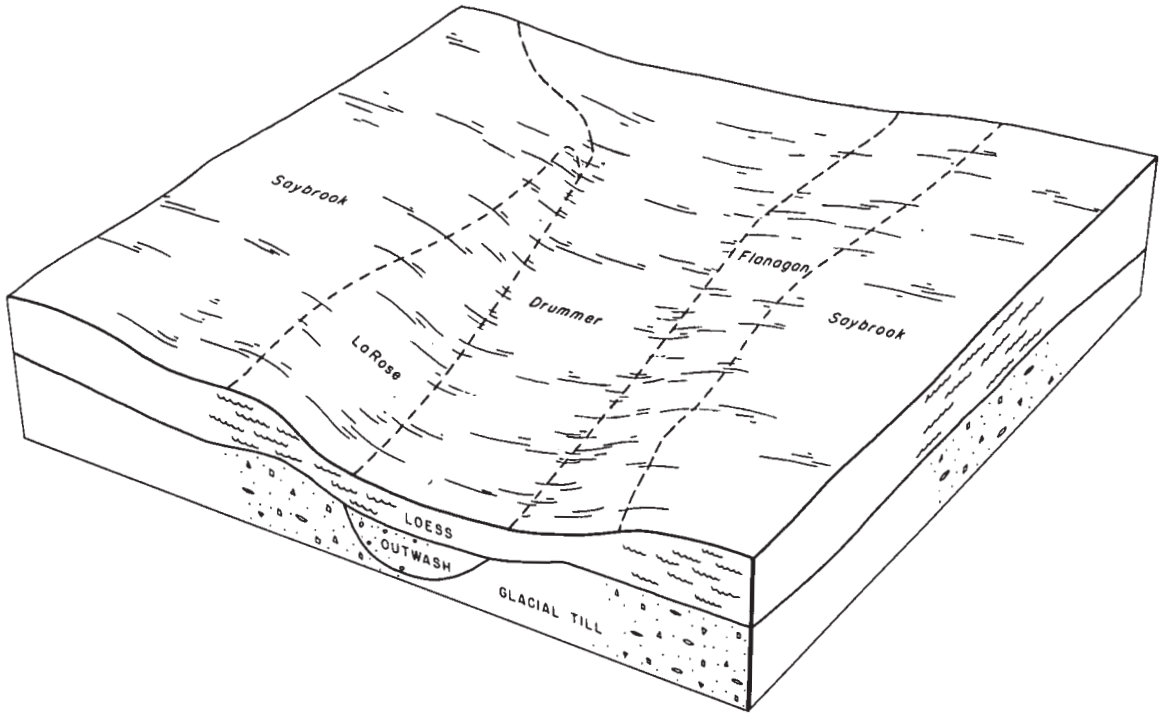

Figure 1.—Relationship of soils to topography and underlying material in the Saybrook-Drummer-Flanagan association.

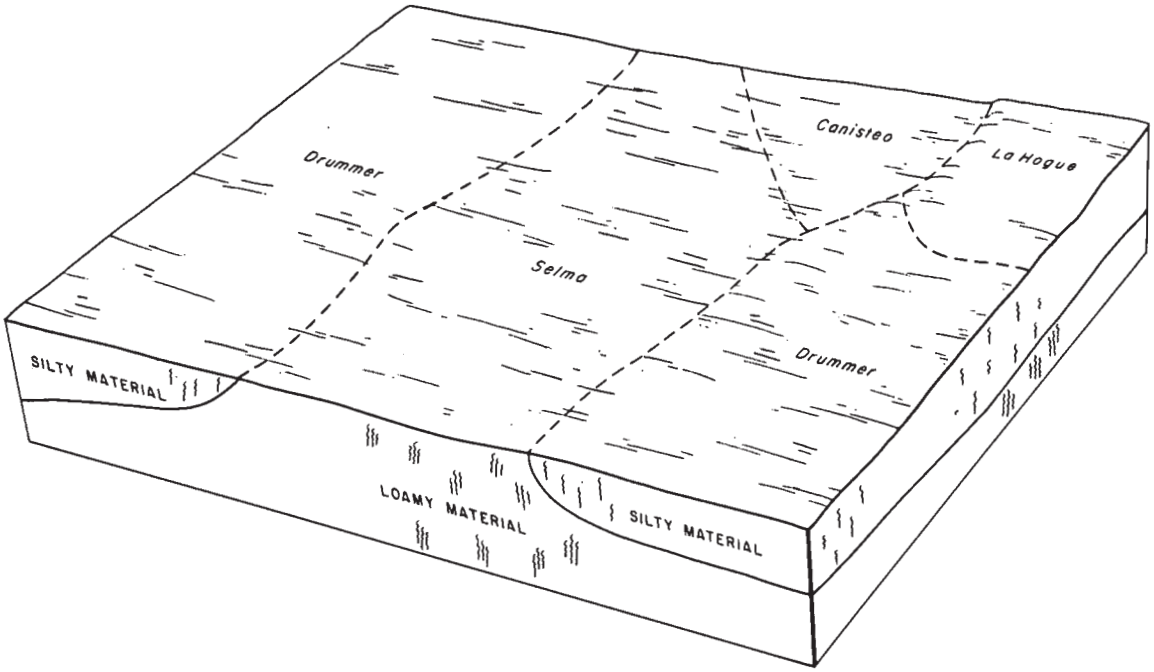

Figure 2.—Relationship of soils to topography and underlying material in the Drummer-Selma-Canisteo association.

Drummer soils are poorly drained. These nearly level soils are mainly in low lying areas and depressions on till and outwash plains. The Drummer soils typically have a surface layer of black silty clay loam about 8 inches thick. The subsurface layer is black and dark gray silty clay loam about 4 inches thick. The subsoil is about 35 inches thick. The upper part is dark gray silty clay loam, the middle part is mottled, olive gray silty clay loam, and the lower part is mottled, olive gray silt loam. The substratum is mixed olive gray and yellowish brown loam and silt loam to a depth of 60 inches.

Selma soils are poorly drained. These nearly level soils are mainly on flat outwash plains and along streams and drainageways. Typically, they have a surface layer of black clay loam about 10 inches thick. The subsurface layer is black, very dark gray, and dark gray loam about 12 inches thick. The subsoil is about 23 inches thick. The upper part is gray, friable loam; and the lower part is gray, stratified loam, clay loam, and sandy loam. The substratum, to a depth of 60 inches, is gray, stratified loam and sandy loam with a little gravel.

Canisteo soils are poorly drained. These nearly level soils are on outwash plains and along drainageways, mainly on flats or in depressional areas on outwash plains. The Canisteo soils typically have a surface layer of very dark gray clay loam about 7 inches thick. The subsurface layer is very dark gray clay loam about 12 inches thick. The subsoil is olive gray silty clay loam about 21 inches thick. The substratum, to a depth of 60 inches, is olive gray and yellowish brown loam.

Of minor extent are Elburn, La Hogue, Parr, and Jasper soils. Elburn soils are somewhat poorly drained. These soils are nearly level to gently sloping. They are on stream terraces and gentle side slopes on uplands. The somewhat poorly drained and nearly level La Hogue soils are on stream terraces and outwash plains. The well drained and nearly level to sloping Parr soils are on upland ridgetops and side slopes on till plains. The well drained, nearly level to sloping Jasper soils are on terraces along streams and on outwash plains.

The soils in this association are used primarily for corn, soybeans, and specialty crops. They are also used for small grain, hay, and alfalfa. Hogs and beef cattle are the main livestock enterprises. Drainage is the main concern of management.

These soils are poorly suited to dwellings and septic tank absorption fields because they are wet and subject to flooding.

3. Plano-Catlin-Saybrook association

Nearly level to sloping, moderately well drained soils that formed in loess over outwash or in loess over glacial till

This soil association consists of soils on ridgetops and side slopes on uplands. It makes up about 24 percent of

the county. It is about 18 percent Plano soils, 17 percent Catlin soils, 6 percent Saybrook soils, and 59 percent soils of minor extent (fig. 3).

Plano soils are moderately well drained. These nearly level to sloping soils are on uplands, mainly on broad ridgetops. The Plano soils typically have a surface layer of very dark gray silt loam about 8 inches thick. The subsurface layer is dark brown and very dark grayish brown silt loam about 6 inches thick. The subsoil is about 39 inches thick. The upper part is dark brown silty clay loam, the middle part is dark yellowish brown silty clay loam, and the lower part is brown and yellowish brown silt loam. The substratum, to a depth of 60 inches, is yellowish brown sandy loam and loam.

Catlin soils are moderately well drained. These nearly level to sloping soils are on uplands, mainly on convex slopes. Typically, the Catlin soils have a surface layer of very dark brown silt loam about 10 inches thick. The subsoil is about 36 inches thick. The upper part is brown and dark brown silty clay loam; the middle part is yellowish brown, mottled silty clay loam; and the lower part is dark yellowish brown clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam till.

Saybrook soils are moderately well drained. These nearly level to sloping soils are on uplands, mainly on ridgetops and valley side slopes. The Saybrook soils typically have a surface layer of very dark gray and very dark grayish brown silt loam about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown silt loam about 3 inches thick. The subsoil is about 23 inches thick. The upper part is brown silty clay loam, the middle part is grayish brown silty clay loam, and the lower part is yellowish brown loam. The substratum, to a depth of 60 inches, is brown, calcareous loam.

Of minor extent are Ogle, Jasper, Palsgrove, Tama, Drummer, and Parr soils. The well drained, gently sloping

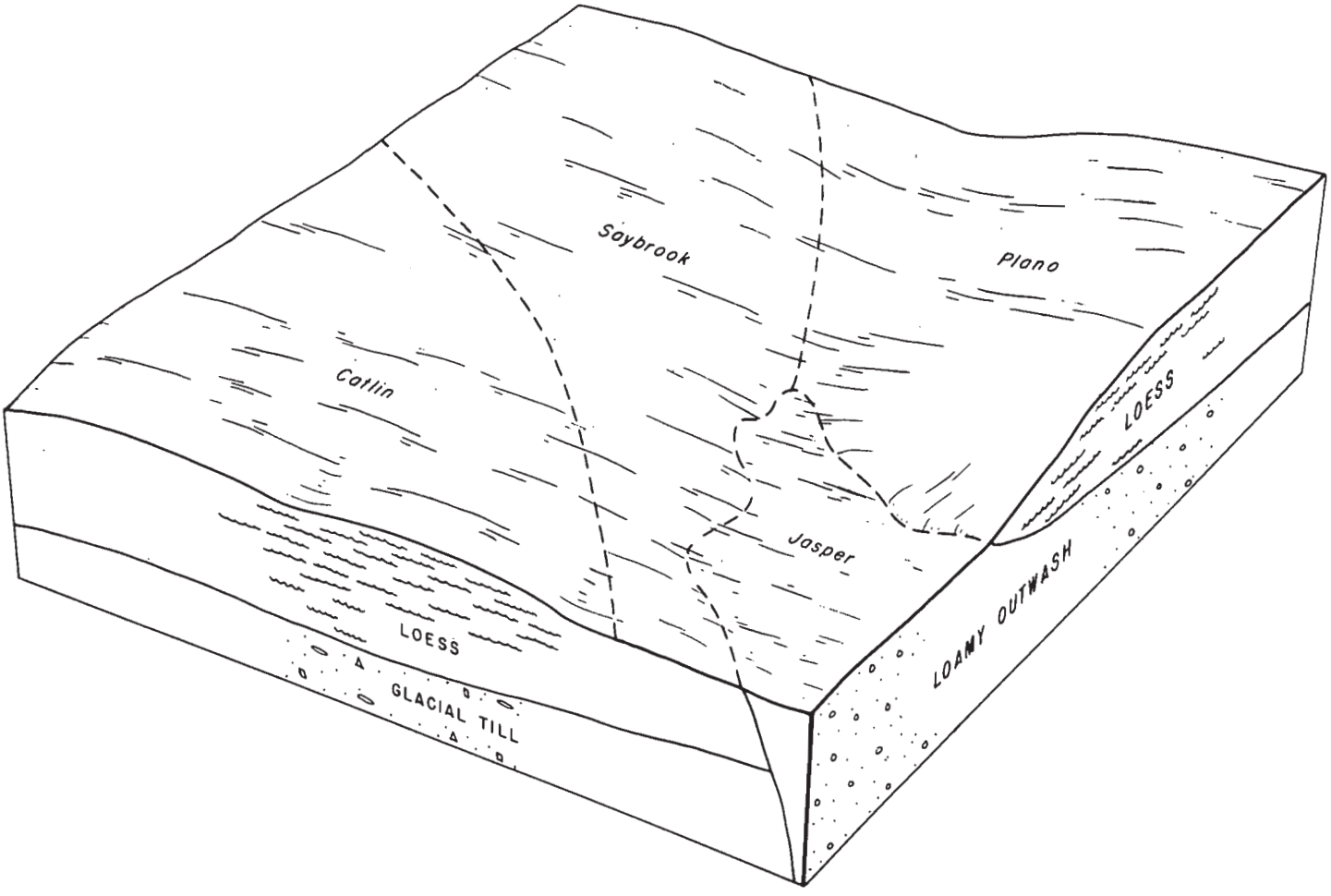

Figure 3.—Relationship of soils to topography and underlying material in the Plano-Catlin-Saybrook association.

to sloping Ogle soils are on ridgetops and side slopes on uplands. The well drained, nearly level to sloping Jasper soils are on outwash plains. The well drained, gently sloping to sloping Palsgrove soils are on broad ridgetops and convex side slopes on uplands. The well drained, nearly level to sloping Tama soils are on convex ridgetops, side slopes, and high stream terraces on uplands. The poorly drained, nearly level Drummer soils are in low lying areas and depressions on till and outwash plains. The well drained, nearly level to sloping Parr soils are on uplands. These soils are on ridgetops and side slopes on till plains.

The soils in this association are primarily used for corn, soybeans, small grain, and hay and pasture. Beef cattle and hogs are the main livestock enterprises. Erosion is the main concern of management.

These soils are only moderately suited to dwellings because they shrink and swell. Plano soils are well suited to septic tank absorption fields, but Catlin soils are poorly suited because they are wet. Saybrook soils are moderately suited to septic tank absorption fields because of wetness and permeability.

4. Jasper-Parr-Varna association

Nearly level to sloping, moderately well drained and well drained soils that formed in loamy material or calcareous till

This soil association consists of soils on convex slopes, ridgetops, and side slopes. It makes up about 5 percent of the county. It is about 32 percent Jasper soils, 21 percent Parr soils, 5 percent Varna soils, and 42 percent soils of minor extent.

Jasper soils are well drained. These nearly level to sloping soils are on outwash plains, mainly on convex slopes and gently undulating outwash plains. Typically, Jasper soils have a surface layer of very dark gray loam about 9 inches thick. The subsurface layer is very dark gray loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is brown silt loam, the middle part is dark yellowish brown clay loam, and the lower part is dark yellowish brown sandy loam and loamy sand. The substratum, to a depth of 60 inches, is yellowish brown and brown silt loam.

Parr soils are well drained. These gently sloping and sloping soils are on uplands, mainly on ridgetops and side slopes on till plains. The Parr soils typically have a very dark gray loam about 7 inches thick. The subsurface layer is mixed very dark brown and very dark grayish brown loam about 5 inches thick. The subsoil is dark yellowish brown and brown clay loam about 17 inches thick. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam till.

Varna soils are moderately well drained. These gently sloping and sloping soils are on uplands, mainly on convex side slopes. The Varna soils typically have a surface layer of very dark grayish brown silt loam about 9 inches thick. The subsurface layer is very dark grayish brown silty clay loam about 5 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown silty clay loam, the middle part is brown silty clay, and the lower part is brown clay loam. The substratum, to a depth of 60 inches, is pale brown, calcareous clay loam till.

Of minor extent are Odell, Selma, Drummer, La Hogue, and Dickinson soils. The somewhat poorly drained, nearly level Odell soils are on till plains on uplands. The poorly drained, nearly level Selma soils are along streams and drainageways on outwash plains. The poorly drained, nearly level Drummer soils are in low lying areas on outwash plains and in depressions on till and outwash plains. The somewhat poorly drained, nearly level La Hogue soils are on stream terraces and outwash plains. The well drained, gently sloping to sloping Dickinson soils are on convex side slopes, on stream benches, and in outwash areas on uplands.

The soils in this association are used primarily for corn, soybeans, small grain, and hay. Hogs and beef cattle are the main livestock enterprises. Erosion and drainage are the main concerns of management.

The soils of this association are well suited to moderately suited to dwellings. Parr and Varna soils are limited because they shrink and swell. These soils are moderately suited to poorly suited to septic tank absorption fields because of the permeability, and Varna soils are also limited by wetness.

Areas dominated by silty soils that formed in loess or in loess over an older buried soil on uplands

These soils are dominantly nearly level to strongly sloping. The most extensive problem is soil erosion.

5. Tama-Ogle-Muscatine association

Nearly level to sloping, well drained and somewhat poorly drained soils that formed in loess or in loess over an older buried soil

This soil association consists of soils on uplands. It makes up about 31 percent of the county. It is about 45 percent Tama soils, 11 percent Ogle soils, 6 percent Muscatine soils, and 38 percent soils of minor extent (fig. 4).

Tama soils are well drained. These soils formed in loess. They are on uplands, mainly on convex ridgetops, side slopes, and high stream benches. The Tama soils typically have a surface layer of black silt loam about 7 inches thick. The subsurface layer is black and very dark grayish brown silt loam about 10 inches thick. The subsoil is about 42 inches thick. The upper part is dark yellowish brown silty clay loam; the middle part is yellowish brown, friable silty clay loam; and the lower part is yellowish brown and very dark grayish brown silt loam. The substratum, to a depth of 68 inches, is yellowish brown silt loam.

Ogle soils are well drained. These nearly level to sloping soils are on uplands, mainly on ridgetops and side

slopes. Typically, the Ogle soils have a surface layer of very dark gray silt loam about 7 inches thick. The subsurface is very dark grayish brown and dark brown silt loam about 4 inches thick. The subsoil is about 65 inches thick. The upper part is dark brown and dark yellowish brown silty clay loam; the middle part is yellowish brown silty clay loam and silt loam; and the lower part is reddish brown and yellowish red, friable loam, and firm clay loam.

Muscatine soils are somewhat poorly drained. These nearly level soils are on uplands, mainly on divides and along drainageways. The Muscatine soils typically have a surface layer of black silt loam about 7 inches thick. The subsurface layer is black silt loam about 9 inches thick. The subsoil is silty clay loam about 34 inches thick. The upper part is very dark grayish brown, the middle part is mottled and dark grayish brown, and the lower part is mottled grayish brown. The substratum, to a depth of 60 inches, is mottled yellowish brown and light olive gray silt loam.

Of minor extent are Catlin, Radford, Assumption, Sable, and Lawson soils. Catlin soils are moderately well drained and nearly level to sloping. These soils are on convex side slopes on uplands. The somewhat poorly drained, nearly level Radford soils are on foot slopes and bottom lands along smaller, intermittent streams. The moderately well drained Assumption soils are in sloping areas. The poorly drained, level and nearly level Sable soils are in drainageways. Lawson soils are somewhat poorly drained and nearly level. These soils are on first and second bottoms near major streams and in old oxbows on outwash plains.

The soils in this association are primarily used for corn, soybeans, small grain, and hay. Dairy cattle is the main livestock enterprise. Erosion is the main concern of management.

These soils are moderately suited to dwellings because they shrink and swell. Muscatine soils are also limited for this use by wetness. Tama and Ogle soils are well suited to septic tank absorption fields, but Muscatine soils are poorly suited because they are wet.

6. Pecatonica-Flagg-Westville association

Gently sloping to strongly sloping, well drained soils that formed in loess over an older buried soil

This soil association consists of soils on ridgetops and covex side slopes. It makes up about 3 percent of the county. It is about 24 percent Pecatonica soils, 22 percent Flagg soils, 8 percent Westville soils, and 46 percent soils of minor extent (fig. 5).

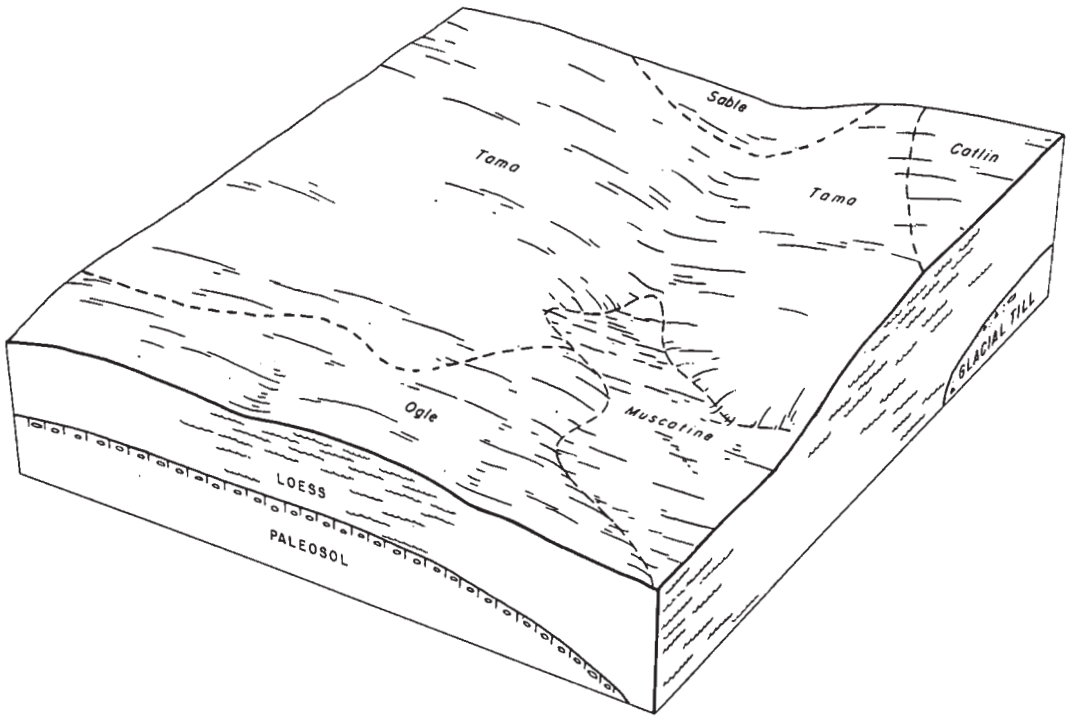

Figure 4.—Relationship of soils to topography and underlying material in the Tama-Ogle-Muscatine association.

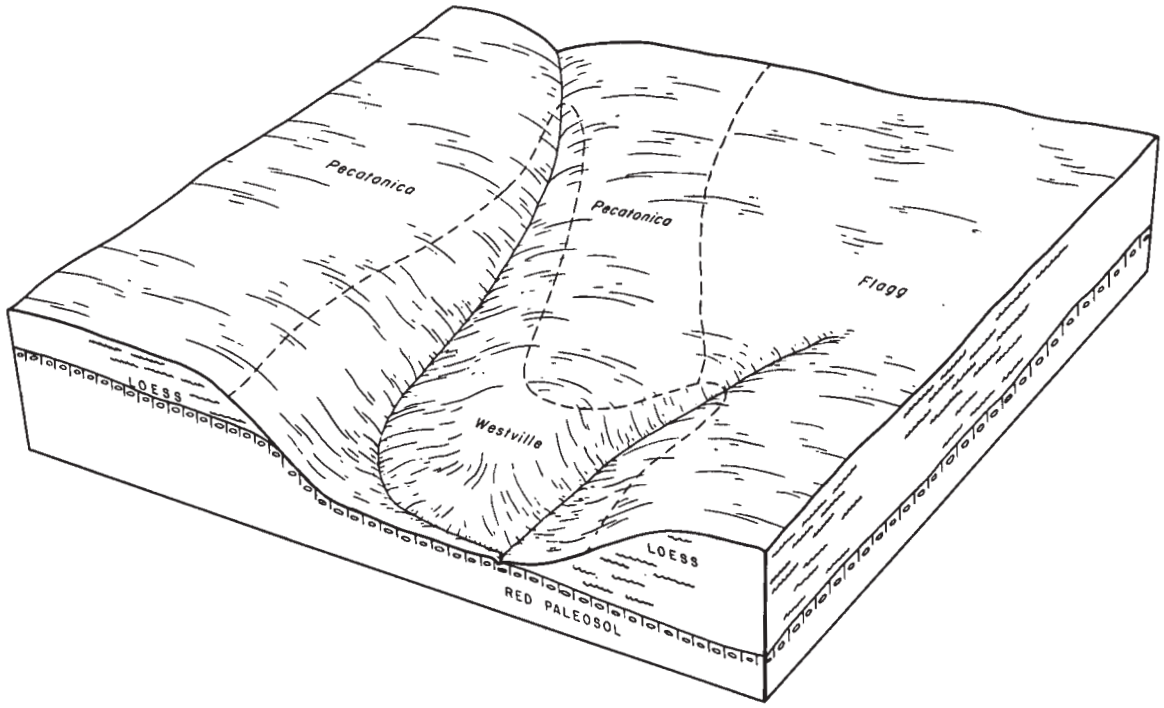

Figure 5.—Relationship of soils to topography and underlying material in the Pecatonica-Flagg-Westville association.

Pecatonica soils are well drained. These gently sloping to strongly sloping soils are on uplands, mainly on ridgetops and side slopes. The Pecatonica soils typically have a surface layer of dark grayish brown silt loam about 6 inches thick. The subsurface layer is very dark yellowish brown silt loam about 5 inches thick. The subsoil is about 40 inches thick. The upper part is yellowish brown and strong brown silty clay loam, the middle part is yellowish red sandy clay loam, and the lower part is yellowish red sandy loam. The substratum, to a depth of 60 inches, is yellowish red sandy loam.

Flagg soils are well drained. These gently sloping to sloping soils are on uplands, mainly on ridgetops and side slopes. Typically, the Flagg soils have a surface layer of dark grayish brown silt loam about 6 inches thick. The subsurface layer is yellowish brown silt about 4 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is yellowish brown silty clay loam, the middle part is dark yellowish brown silty clay loam, and the lower part is yellowish brown and yellowish red sandy clay loam.

Westville soils are well drained. These sloping to strongly sloping soils are on uplands, mainly on side slopes. The Westville soils typically have a surface layer of dark grayish brown silt loam about 5 inches thick. The subsoil is 37 inches thick. The upper part is yellowish brown silt loam, the middle part is strong brown clay loam, and the lower part is yellowish red sandy clay loam and sandy loam. The substratum, to a depth of 60 inches, is mixed yellowish red and strong brown loam and sandy loam.

Of minor extent in this association are Kidder, Myrtle, Martinsville, Fayette, and Miami soils. The well drained, gently sloping to strongly sloping Kidder soils are on side slopes on uplands. The well drained, gently sloping Myrtle soils are on ridgetops and side slopes on uplands. The well drained, nearly level to strongly sloping Martinsville soils are on stream terraces and outwash plains on uplands. The well drained, gently sloping to strongly sloping Fayette soils are on convex ridges and side slopes on uplands. The well drained, gently sloping to moderately steep Miami soils are on convex ridgetops and side slopes on uplands.

The soils in this association are primarily used for cultivated crops, pasture, and woodland. Hogs and beef cattle are the main livestock enterprises. Erosion is the main concern of management.

These soils are moderately suited to dwellings because they shrink and swell. They are well suited to moderately suited to septic tank absorption fields; however, slope is a limitation in some areas of Pecatonica and Westville soils. Flagg soils are limited for septic tank absorption fields by the permeability of the subsoil.

7. Fayette-Downs association

Nearly level to strongly sloping, well drained soils that formed in loess

This soil association consists of soils on broad, flat ridgetops, convex ridges, side slopes, and high stream

terraces. It makes up about 9 percent of the county. It is about 41 percent Fayette soils, 32 percent Downs soils, and 27 percent soils of minor extent (fig. 6).

Fayette soils are well drained. These gently sloping to strongly sloping soils are on uplands, mainly on convex ridges, side slopes, and high stream terraces. The Fayette soils typically have a surface layer of dark grayish brown silt loam about 7 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil is about 43 inches thick. The upper part is yellowish brown and dark yellowish brown silty clay loam, and the lower part is dark yellowish brown, yellowish brown, and brownish yellow silt loam. The substratum, to a depth of 60 inches, is brown, yellowish brown, and brownish yellow silt loam.

Downs soils are well drained. These gently sloping soils are on uplands, mainly on broad, flat ridgetops. Typically, the Downs soils have a surface layer of very dark gray silt loam about 7 inches thick. The subsoil is 53 inches thick. The upper part is dark brown silty clay loam, the middle part is yellowish brown silty clay loam, and the lower part is yellowish brown silt loam.

Of minor extent are Rozetta, Pecatonica, Palsgrove, Lawson, Whalan, and Comfrey soils. The moderately well drained, nearly level Rozetta soils are on uplands. The well drained, gently sloping to strongly sloping Pecatonica soils are on ridgetops and side slopes on uplands. The well drained, gently sloping to sloping Palsgrove soils are on ridgetops and convex slopes on uplands. The somewhat poorly drained, nearly level Lawson soils are on first and second bottom lands near major streams and in old oxbows on outwash plains. The well drained, nearly level to moderately steep Whalan soils are on convex crests of knolls and valley slopes on uplands. The poorly drained, nearly level Comfrey soils are on bottom lands of rivers, streams, and drainageways.

The soils in this association are primarily used for corn, soybeans, small grain, and hay. Hogs, beef, and dairy cattle are the main livestock enterprises. Erosion and drainage are the main concerns of management.

These soils are moderately suited to dwellings because they shrink and swell. Some areas of Fayette soils are also limited for this use by slope. These soils are generally well suited to septic tank absorption fields although some areas of Fayette soils are limited by slope.

Areas dominated by sandy, loamy, and silty soils that are moderately deep or deep over bedrock, on uplands

These soils are dominantly nearly level to very steep. The most extensive problem is soil erosion.

8. Boone-Eleva-Chelsea association

Gently sloping to very steep, excessively drained to well drained soils that formed in sandy or loamy material over sandstone bedrock or sandy material

This soil association consists of soils on ridgetops, valley slopes, and strong side slopes. It makes up about 3 percent of the county. It is about 20 percent Boone soils, 16 percent Eleva soils, 15 percent Chelsea soils, and 49 percent soils of minor extent (fig. 7).

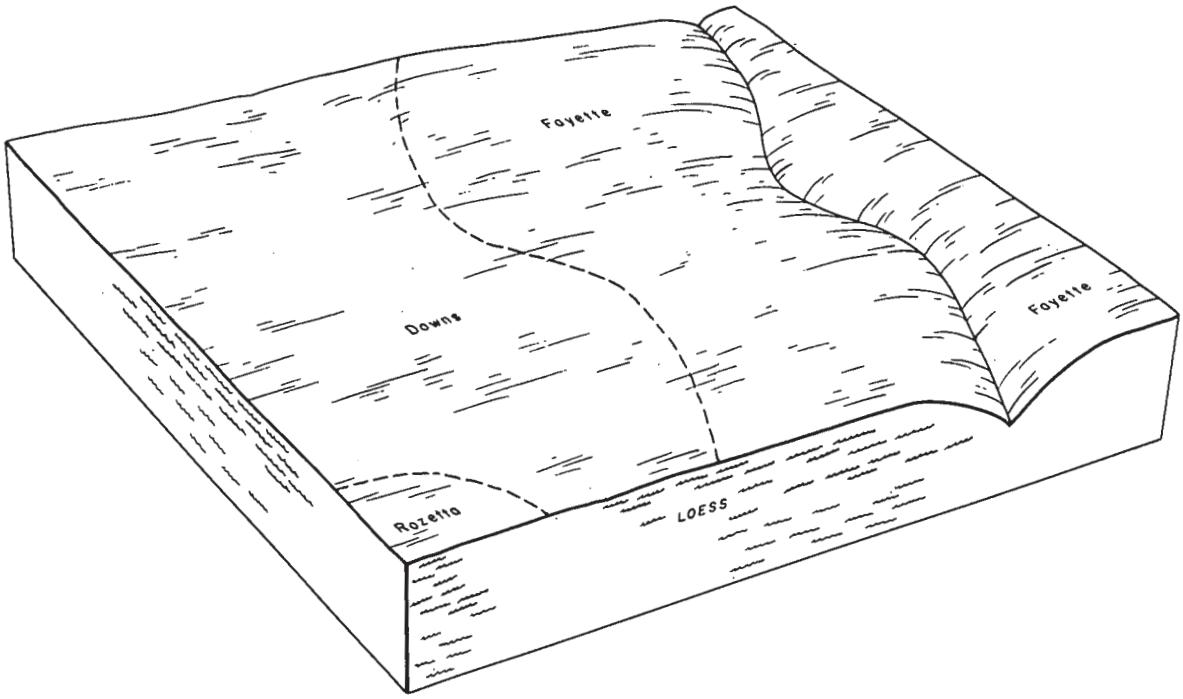

Figure 6.—Relationship of soils to topography and underlying material in the Fayette-Downs association.

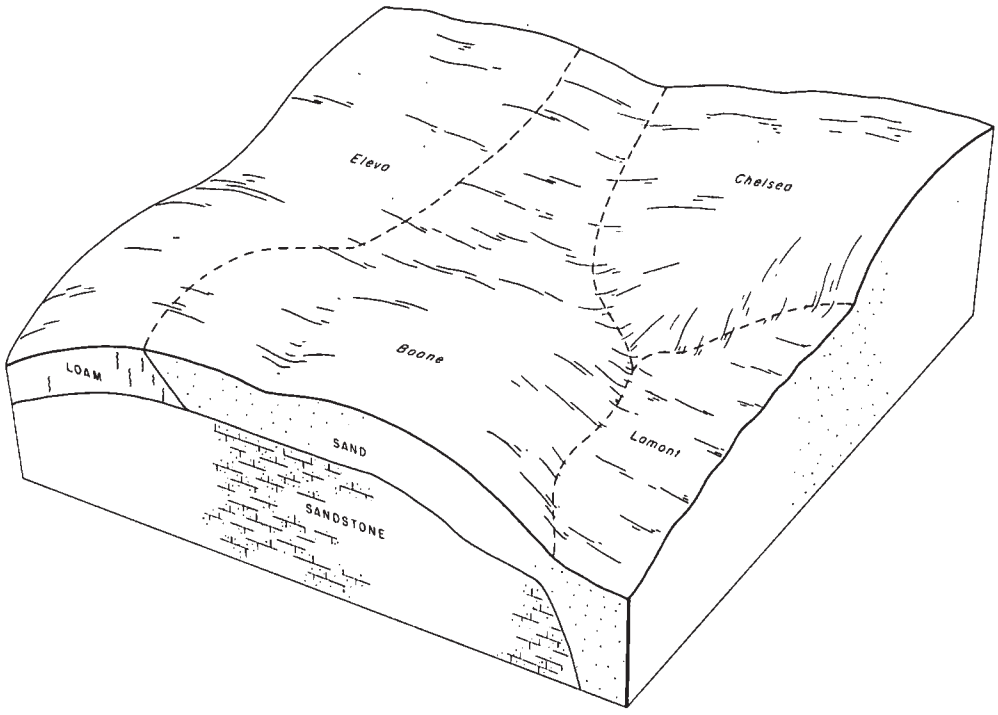

Figure 7.—Relationship of soils to topography and underlying material in the Boone-Eleva-Chelsea association.

Boone soils are excessively drained. These gently sloping to very steep soils are on uplands, mainly on ridgetops and valley side slopes. Boone soils typically have a surface layer of very dark grayish brown and dark brown sand about 3 inches thick. The substratum, to a depth of 34 inches, is light yellowish brown sand over weathered sandstone.

Eleva soils are somewhat excessively drained and well drained. These gently sloping to steep soils are on uplands, mainly on ridgetops and strong side slopes. Typically, Eleva soils have a surface layer of very dark gray sandy loam about 4 inches thick. The subsurface layer is yellowish brown sandy loam about 5 inches thick. The subsoil is about 23 inches thick. The upper part is yellowish brown sandy loam, and the lower part is yellowish brown and brownish yellow loamy sand. The substratum, to a depth of 36 inches, is brownish yellow sand over weakly cemented to strongly cemented sandstone bedrock.

Chelsea soils are excessively drained. These gently sloping to steep soils are on uplands, mainly on ridgetops and side slopes. Chelsea soils typically have a surface layer of very dark brown loamy sand about 3 inches thick. The subsurface layer is yellowish brown sand about 35 inches thick. The lower part has bands of brown loamy sand. The substratum, to a depth of 60 inches, is brownish yellow sand with thin layers of brown loamy sand.

Of minor extent in this association are Lamont, Martinsville, Dickinson, Selma, Downs, and Jasper soils. The well drained, gently sloping to sloping Lamont soils are on convex knolls, side slopes, and parts of high stream benches on uplands. The well drained, nearly level to strongly sloping Martinsville soils are on terraces and outwash plains on uplands. The well drained, gently sloping to sloping Dickinson soils are on convex slopes and stream benches and in outwash areas on uplands. The poorly drained, nearly level Selma soils are on flats of outwash plains and along streams and drainageways. The well drained, nearly level to gently sloping Downs soils are on broad, flat ridgetops on uplands. The well drained, nearly level to sloping Jasper soils are on terraces along streams and outwash plains.

The soils in this association are primarily used for permanent pasture and woodlots. Some of the less sloping soils are used for cultivated crops. Hogs and beef cattle are the main livestock enterprises. Erosion is the main concern of management.

This association generally is moderately suited to dwellings because of slope and the moderate depth to bedrock in the Boone and Eleva soils. Areas of steep Boone soils are poorly suited to dwellings. Boone and Eleva soils are also poorly suited to septic tank absorption fields because of the shallow depth to bedrock. The gently sloping Chelsea soils are well suited to dwellings. They range from well suited to moderately suited to septic tank absorption fields because, in places, slope is a limitation.

9. Martinsville-Whalan-Rockton association

Nearly level to moderately steep, well drained soils that formed in loamy material or in loamy and clayey material over dolomite bedrock

This soil association consists of soils on plane and convex side slopes and ridges. It makes up about 6 percent of the county. It is about 32 percent Martinsville soils, 26 percent Whalan soils, 19 percent Rockton soils, and 23 percent soils of minor extent.

Martinsville soils are well drained. These nearly level to strongly sloping soils are on uplands, mainly on stream terraces and outwash plains. The Martinsville soils typically have a surface layer of very dark gray silt loam about 4 inches thick. The subsurface layer is dark gray and brown silt loam about 6 inches thick. The subsoil is about 35 inches thick. The upper part is dark yellowish brown silt loam and silty clay loam, the middle part is yellowish brown clay loam, and the lower part is yellowish brown sandy loam. The substratum, to a depth of 60 inches, is mottled yellowish brown, strong brown, dark brown and gray clay loam and silt loam.

Whalan soils are well drained. These nearly level to steep soils are on uplands, mainly on convex crests of knolls and valley side slopes. Typically, they have a surface layer of dark grayish brown loam about 7 inches thick. The subsurface layer is dark grayish brown loam about 3 inches thick. The subsoil is about 28 inches thick. The upper part is dark brown clay loam, the middle part is dark yellowish brown clay loam, and the lower part is reddish brown clay. The substratum is brownish yellow dolomite bedrock.

Rockton soils are well drained. These gently sloping to sloping soils are on uplands, mainly on convex side slopes and ridges. The Rockton soils typically have a surface layer of black silt loam about 7 inches thick. The subsurface layer is black, very dark gray, and dark brown silt loam about 15 inches thick. The subsoil is about 7 inches thick. The upper part is brown clay loam, and the lower part is dark yellowish brown clay. The substratum is brownish yellow loamy sand. Limestone bedrock is at a depth of 31 inches.

Of minor extent are Ashdale, Jasper, Miami, Fayette, and Kidder soils. The well drained, gently sloping to sloping Ashdale soils are on broad ridgetops and side slopes on uplands. The well drained, nearly level to sloping Jasper soils are on convex slopes on outwash plains. The well drained, gently sloping to moderately steep Miami soils are on convex ridgetops and side slopes on uplands. The well drained, gently sloping to strongly sloping Fayette soils are on convex ridges, side slopes, and high stream terraces on uplands. The well drained, gently sloping to strongly sloping Kidder soils are on side slopes on uplands.

The soils in this association are primarily used for corn, soybeans, hay, small grain, and some forest. Hogs and beef cattle are the main livestock enterprises. Erosion is the main concern of management.

These soils generally are moderately suited to dwellings because of the shrink-swell potential of the Martinsville and Rockton soils and the moderate depth to bedrock in the Whalan soils. Whalan soils, however, are well suited to dwellings without basements. The nearly level and gently sloping Martinsville soils are well suited to septic tank absorption fields, but the moderately sloping and strongly sloping Martinsville soils are moderately suited because of slope. Whalan and Rockton soils are poorly suited to septic tank absorption fields because bedrock is at a depth of 20 to 40 inches.

Areas dominated by loamy and silty soils that formed in alluvium or outwash materials on flood plains and terraces

These soils are dominantly nearly level to sloping, but some soils along major creeks and the Kyte and Leaf Rivers are strongly sloping. The most extensive problem is flooding and the drainage of soils.

10. Lawson-Comfrey-Jasper association

Nearly level to sloping, somewhat poorly drained, poorly drained, and well drained soils that formed in silty and loamy alluvium or in loamy material over outwash

This soil association consists of soils on terraces and bottom lands. It makes up about 6 percent of the county. It is about 37 percent Lawson soils, 26 percent Comfrey soils, 24 percent Jasper soils, and 13 percent soils of minor extent.

Lawson soils are somewhat poorly drained. These nearly level soils are mainly on first and second bottoms near major streams and in old oxbows on outwash plains. The Lawson soils typically have a surface layer of very dark grayish brown silt loam 8 inches thick. The subsurface layer is very dark gray and black about 51 inches thick. The substratum is very dark gray, stratified silty clay loam to a depth of 75 inches.

Comfrey soils are poorly drained. These nearly level soils are mainly on bottom lands of rivers, streams, and drainageways. Typically, they have a surface layer of black clay loam about 7 inches thick. The subsurface layer is black clay loam and loam about 28 inches thick. The substratum, to a depth of 60 inches, is mottled dark gray, very dark gray, and dark grayish brown loam.

Jasper soils are well drained. These nearly level to sloping soils are mainly on terraces along streams and on outwash plains. Jasper soils typically have a surface layer of very dark gray loam about 9 inches thick. The subsurface layer is very dark gray loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is brown silt loam. The middle part is dark yellowish brown clay loam. The lower part is dark yellowish brown sandy loam and loamy sand. The substratum, to a depth of 60 inches, is yellowish brown and brown silt loam.

Of minor extent are Dickinson, Warsaw, Wea, Martinsville, and Kidder soils. The well drained, gently sloping to sloping Dickinson soils are on convex slopes and stream

benches and in outwash areas on uplands. The well drained, gently sloping to sloping Warsaw soils are on terraces and outwash plains. The well drained, nearly level to gently sloping Wea soils are on terraces and outwash plains. The well drained, nearly level to strongly sloping Martinsville soils are on stream terraces and outwash plains on uplands. The well drained, gently sloping to strongly sloping Kidder soils are on side slopes on uplands.

The soils in this association are primarily used for corn, soybeans, and small grain. Hogs and beef cattle are the main livestock enterprises. Erosion and drainage are the main concerns of management. The soils are used primarily for agriculture, but if they are used for dwellings or sanitary facilities, caution should be taken bacause of the high water table and flooding in lower areas.

These soils are generally not suited to dwellings and septic tank absorption fields because they are subject to flooding and are wet. The well drained Jasper soils are well suited to dwellings but are moderately suited to septic tank absorption fields because of the permeability.

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, salinity, 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, Tama silt loam, 0 to 2 percent slopes, is one of several phases in the Tama series.

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

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Rodman-Warsaw complex, 5 to 12 percent slopes is an example.

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

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

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 and potentials

21B—Pecatonica silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex side slopes. Areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is dark yellowish brown silt loam about 5 inches thick. The subsoil is about 40 inches thick. The upper part is yellowish brown and strong brown, friable silty clay loam; the middle part is yellowish red, friable sandy clay loam; and the lower part is yellowish red, friable sandy loam. The substratum, to a depth of 60 inches, is yellowish red sandy loam. In a few areas, the surface layer is yellowish red clay loam. In other areas, the subsoil is thicker and deeper to the reddish sandy loam material than is typical. In some areas, the depth to calcareous material is less than 42 inches. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Whalan soils that are adjacent to Pecatonica soils on similar landscapes. These soils are 2 to 3 feet of loamy material over limestone bedrock. They make up 2 to 10 percent of the unit.

This Pecatonica soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2 percent organic matter. It is friable and easily tilled throughout a fairly wide range in moisture content. It

crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid or very strongly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 30 inches by compact, reddish loamy till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to dwellings and septic tank absorption fields. Foundations for dwellings need to be designed to overcome the moderate shrink-swell potential of the soil. Local streets and roads are limited by low strength of the soil. Their quality can be improved by replacing the base material.

This soil is in capability subclass IIe.

21C2—Pecatonica silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex side slopes and ridgetops. Areas are irregular in shape and range from 3 to 55 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is about 38 inches thick. The upper part is strong brown and yellowish brown, friable silty clay loam; the middle part is yellowish red, friable sandy clay loam; and the lower part is yellowish red, friable sandy loam. The substratum, to a depth of 60 inches, is yellowish red sandy loam. In areas where the upper part of the subsoil has been mixed with the former surface layer by plowing, the present surface layer is dark yellowish brown silty clay loam. In other areas, it is reddish clay loam. In some areas, the subsoil is thicker and deeper to the reddish sandy loam material than is typical. In some places, this soil is moderately well drained.

Included with this soil in mapping are small areas of Whalan and Woodbine soils that have bedrock within a depth of 60 inches. Whalan and Woodbine soils are in similar positions on ridgetops as this Pecatonica soil. These soils make up 10 to 15 percent of the unit.

This Pecatonica soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid or very strongly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 30 inches by compact, reddish loamy till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to dwellings and septic tank absorption fields. Foundations for dwellings need to be designed to overcome the moderate shrink-swell potential. Replacing the base material improves the quality of local streets and roads.

This soil is in capability subclass IIIe.

21D2—Pecatonica silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is along drainageways. Areas are long and narrow and range from 2 to 25 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 35 inches thick. The upper part is strong brown and yellowish brown, friable silty clay loam; the middle part is yellowish red, friable sandy clay loam; and the lower part is yellowish red, friable sandy loam. The substratum, to a depth of 60 inches, is yellowish red sandy loam. In areas where the upper part of the subsoil has been mixed with the former surface layer by plowing, the present surface layer is yellowish brown silty clay loam. In other areas, it is reddish clay loam. In some areas, the subsoil is thicker and deeper to the reddish sandy loam material than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of Whalan and Woodbine soils that have bedrock within a depth of 60 inches and Sogn soils that have bedrock within a depth of 20 inches. Whalan and Woodbine soils are in similar positions on the landscape as the Pecatonica soils, and Sogn soils are on the steeper side slopes. These included soils make up 10 to 25 percent of the unit.

This Pecatonica soil has moderate permeability. Surface runoff from culivated areas is rapid, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It is difficult to till because it crusts after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid or very strongly acid. It has a moderate shrink-swell potential. Root development is restricted below a depth of about 28 inches by compact, reddish loamy till.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and terraces help prevent excessive soil loss.

Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard when planting or harvesting trees.

This soil is only moderately suited to dwellings and septic tank absorption fields. Foundations for dwellings need to be designed to overcome the moderate shrink-swell potential. The slope may also require some alteration. The soil does not have sufficient strength and stability to support vehicular traffic, but strengthening or replacing the base material can correct this limitation. Slope is a limitation for septic tank absorption fields. This limitation can be overcome by placing filter lines on the contour.

This soil is in capability subclass IIIe.

22C2—Westville silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on upper parts of side slopes on uplands. Areas are irregular in shape and range from 2 to 20 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 37 inches thick. The upper part is yellowish brown silt loam; the middle part is strong brown clay loam; and the lower part is yellowish red sandy clay loam and sandy loam. The substratum, to a depth of 60 inches, is yellowish red and strong brown loam and sandy loam. In places, the surface layer is thicker and darker than is typical. The sandy loam till is closer to the surface in some places. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Whalan soils on side slopes. These soils have bedrock within a depth of 40 inches and make up 2 to 5 percent of the unit.

This Westville silt loam has moderate permeability. Surface runoff from cultivated areas is medium and available water capacity is high. The surface layer is about 1.5 percent organic matter. It crusts or puddles after hard rain, especially where the plow layer contains subsoil material. The subsoil is neutral. It has a moderate shrink-swell potential. Root development is restricted below a depth of about 18 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, grasses, and legumes. There is a hazard of further erosion if the soil is used for cultivated crops. Conservation tillage, contour farming, and terraces help minimize soil losses. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to building sites and septic tank absorption fields. There is a hazard of further erosion if large areas are not protected with a vegetative cover during construction. Foundations for dwellings need to be designed to overcome shrink-swell potential. This soil is limited by low strength for roads and streets. Roads and streets can be improved by replacing the base material.

This soil is in capability subclass IIe.

22D2—Westville silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on upland side slopes next to drainageways and streams. Areas are irregular in shape and range from 5 to 20 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is about 35 inches thick. The upper part is yellowish brown silt loam; the middle part is strong brown clay loam; and the lower part is yellowish red sandy clay loam and sandy loam. The substratum, to a depth of 60 inches, is mixed yellowish red and strong brown loam and sandy loam. In some places, the sandy loam till is closer to the surface than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Whalan soils on side slopes. These soils have bedrock within a depth of 40 inches and make up 2 to 5 percent of the unit.

This Westville soil has moderate permeability. Surface runoff from cultivated areas is rapid, and available water capacity is high. The surface layer is about 1.5 percent organic matter. The subsoil is neutral. The shrink-swell potential is moderate in the subsoil. The underlying material is calcareous.

This soil is suited to small grain and grasses and legumes if such proper conservation practices as contour farming, terraces, and contour strips are used. Minimum tillage helps keep soil losses to a minimum; reduces soil compaction and formation of a tillage pan; improves aeration, permeability, and tilth of the soil; and conserves moisture. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. Trees grow well when erosion is controlled, burning is not permitted, and livestock is excluded from all woodland areas. Tree seeds, cuttings, and seedlings survive and grow well when competing vegetation is controlled or removed by site preparation or spraying, cutting, or girdling. Slope is the main limitation to planting or harvesting trees.

This soil is only moderately suited to dwellings and septic tank absorption fields. Excessive erosion is a hazard if large areas of vegetative cover are removed during construction. Foundations for dwellings need to be designed to overcome the shrink-swell potential. The low strength of this soil is a limitation for local streets and roads. Local streets and roads can be improved by

replacing the base material. The slope limitation for septic tank absorption fields can be overcome by placing the filter lines on the contour.

This soil is in capability subclass IIIe.

24B—Dodge silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls and broad divides on uplands. Areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is yellowish brown silt loam about 7 inches thick. The subsoil is about 22 inches thick. The upper part is dark yellowish brown and yellowish brown, friable silty clay loam; and the lower part is yellowish brown, friable clay loam. The substratum, to a depth of 60 inches, is light yellowish brown, massive, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. In some places, the soil is moderately well drained.

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

This Dodge soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid or medium acid. In addition it has a moderate shrink-swell potential. This soil has a high susceptibility to frost heave. Root development is restricted below a depth of about 34 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and contour farming help prevent excessive soil loss. Returning crop residue to the soil or the regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small acres remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to dwellings and septic tank absorption fields. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Damage to buildings from the shrink-swell action of the soil can be reduced by the design of the foundation.

This soil is in capability subclass IIe.

24C2—Dodge silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on short, convex side slopes of upland ridges. Areas are irregular in shape and range from 3 to 55 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is about 20 inches thick. The upper part is dark yellowish brown and yellowish brown, friable silty clay loam; and the lower part is yellowish brown, friable clay loam. The substratum, to a depth of 60 inches, is light yellowish brown, massive, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of Miami soils. These soils are sandier in the subsoil than this Dodge soil and are on convex side slopes. They make up 5 to 10 percent of the unit.

This Dodge soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid or medium acid. In addition, it has moderate shrink-swell potential. This soil has a high susceptibility to frost action. Root development is restricted below a depth of about 30 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or the regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to dwellings and septic tank absorption fields. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Damage to buildings from the shrink-swell action of the soil can be reduced by the design of the foundation.

This soil is in capability subclass IIIe.

27B—Miami loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls and short, uneven side slopes. Areas are irregular in shape and range from 2 acres to more than 100 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 9 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown, friable clay loam; the middle part is dark brown, friable clay loam; and the lower part is dark brown and dark yellowish brown clay loam. The substratum, to a depth of about 60 inches, is yellowish brown, calcareous loam. In some places, there is a subsurface layer and the subsoil is thicker than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall and Odell soils and poorly drained Drummer and Selma soils. These soils are in shallow depressions and make up 2 to 10 percent of the unit.

This Miami soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2 percent organic matter. It is friable and easily tilled throughout a fairly wide range in moisture content. It crusts or puddles after hard rain, especially when worked wet. The subsoil is slightly acid or medium acid. The shrink-swell potential is moderate in the subsoil. Root development is somewhat restricted below a depth of about 42 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to dwellings. Foundations for dwellings need to be designed to overcome the shrink-swell potential. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by replacing the base material. The soil is moderately suited to septic tank absorption fields. Enlarging the area of the absorption field helps overcome the moderate permeability of the soil.

This soil is in capability subclass IIe.

27C2—Miami loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex side slopes. Areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 8 inches thick. The subsoil is about 26 inches thick. It is dark yellowish brown and dark brown, friable clay loam. The substratum, to a depth of about 60 inches, is yellowish brown, calcareous loam. In some places, there is a subsurface layer, and the subsoil is thicker than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall and Odell soils. These soils are in shallow depressions and make up 2 to 10 percent of the unit.

This Miami soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid or slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is somewhat restricted below a depth of about 38 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, there is erosion damage. Conservation tillage, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard when planting or harvesting trees.

This soil is suited to dwellings when foundations are designed to overcome the shrink-swell potential. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by replacing the base material. The soil is moderately suited to septic tank absorption fields. Enlarging the area of the absorption field helps overcome the moderate permeability of the soil.

This soil is in capability subclass IIIe.

27D2—Miami loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on ridgetops and on short, convex side slopes. Areas are long and narrow in shape and range from 2 to 55 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 5 inches thick. The subsurface layer is mixed with the surface layer by plowing. The subsoil is about 25 inches thick. The upper part is dark yellowish brown, friable clay loam; the middle part is dark brown, friable clay loam; and the lower part is dark yellowish brown clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous light silty clay loam. In some places, there is a subsurface layer, and the subsoil is thicker than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Pecatonica and Whalan soils that are adjacent to Miami soils. Pecatonica soils have a substratum of reddish clay loam or sandy loam. In Whalan soils, limestone bedrock is at a depth of 2 to 3 feet. These soils make up 5 to 10 percent of the unit.

This Miami soil has moderate permeability. Surface runoff from cultivated areas is rapid, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It crusts after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid or slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 35 inches by compact, loamy glacial till.

Some areas of this soil are cultivated. The soil has fair suitability for hay and pasture and good suitability for woodland. It has fair suitability for dwellings and poor suitability for septic tank absorption fields.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main limitation when planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings when foundations are designed to overcome the shrink-swell potential and the slope is altered. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by replacing the base material. The soil is moderately suited to septic tank absorption fields. Enlarging the area of the absorption field and placing it on the contour helps overcome the permeability and slope limitations.

This soil is in capability subclass IIIe.

27E2—Miami loam, 15 to 20 percent slopes, eroded. This moderately steep, well drained soil is on ridgetops and short, convex side slopes. Areas are short and narrow in shape and range from 2 to 40 acres in size.

Typically, the surface layer is dark grayish brown, friable loam about 4 inches thick. The subsoil is about 24 inches thick. The upper part is dark yellowish brown, friable clay loam; the middle part is dark brown, friable clay loam; and the lower part is dark yellowish brown, clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam. In some places, there is a subsurface layer and the subsoil is thinner than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of Pecatonica and Whalan soils that are adjacent to Miami soils. Pecatonica soils have a substratum of reddish clay loam or sandy loam. In Whalan soils, limestone bedrock is at a depth of 2 to 3 feet. These soils make up 5 to 10 percent of the unit.

This Miami soil has moderate permeability. Surface runoff from cultivated areas is rapid, and available water capacity is high. The surface layer is about 1 percent organic matter. The subsoil is medium acid or slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 32 inches by compact, loamy glacial till.

Some areas of this soil are cultivated. The soil has fair suitability for hay and pasture and good suitability for woodland. It has poor suitabilily for dwellings and septic tank absorption fields.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and contour farming help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation when planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is in capability subclass IVe.

29D2—Dubuque silt loam, 7 to 15 percent slopes, eroded. This sloping to strongly sloping, well drained soil is on ridgetops and on convex side slopes. Areas are long and narrow in shape and range from 3 to 20 acres in size.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil is about 26 inches thick. The upper part is dark yellowish brown and yellowish brown, friable silty clay loam; and the lower part is very firm, reddish brown clay. Limestone bedrock is at a depth of about 32 inches. In some places, there is a subsurface layer, and the subsoil is thicker and deeper to limestone than is typical. In areas where the upper part of the subsoil has been mixed with the former surface soil by plowing, the present surface layer is yellowish brown silty clay loam.

Included with this soil in mapping are small areas of Palsgrove soils that are deeper to bedrock than this Dubuque soil and Sogn soils that are shallower to bedrock. Palsgrove soils are in similar positions on ridgetops as the Dubuque soil, and Sogn soils are on steeper side slopes. The soils make up 2 to 10 percent of the unit.

The Dubuque soil has moderate permeability in the silty material, slow permeability in the clay layer, and somewhat variable permeability in the fractured limestone bedrock. Surface runoff from cultivated areas is medium and available water capacity is moderate. The surface layer is 1.5 percent organic matter. It crusts after hard rain, especially in areas where the plow layer con-

tains subsoil material. The subsoil is medium acid. In addition, it has moderate shrink-swell potential. This soil has a high susceptibility to frost action. Root development is restricted below a depth of 2 or 3 feet by limestone bedrock.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Conservation tillage, cover crops, and contour farming help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration and retention.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main limitation when planting or harvesting trees.

Using this soil for pasture effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings without basements, but foundations must be designed to overcome the limitations of shrink-swell potential and slope. Damage to roads and streets from frost action can be prevented by replacing the base material. There is a hazard that effluent from septic tank absorption fields can contaminate ground water supplies as a result of rapid infiltration into fissures of limestone bedrock. Connecting building sites to a central sewer system minimizes this limitation. The underlying limestone bedrock is a source of agricultural lime or crushed rock.

This soil is in capability subclass IIIe.

36A—Tama silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad, convex side slopes on uplands. Areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is black and very dark grayish brown silt loam about 12 inches thick. The subsoil is about 43 inches thick. The upper part is dark yellowish brown, friable silty clay loam; the middle part is yellowish brown, friable silty clay loam; and the lower part is yellowish brown and very dark grayish brown silt loam. The substratum, to a depth of about 68 inches, is yellowish brown silt loam. In a few areas, the surface layer is thinner and darker colored than is typical. In some places, the substratum is stratified silt loam, loam, and sandy loam. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Muscatine soils and poorly drained Drummer and Sable soils. These soils are in shallow depressions and drainageways and make up 2 to 10 percent of the unit.

This Tama soil has moderate permeability. Runoff from cultivated areas is slow, and available water capacity is very high. The surface layer is about 3.5 percent organic matter. The subsoil is medium acid. The soil has a high susceptibility to frost heave. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Minimum tillage, contour farming, and cover crops help prevent excessive soil loss and improve water intake. Returning crop residue to the soil reduces crusting and improves tilth.

This soil is suited to dwellings when foundations are designed to overcome the shrink-swell potential. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. It is well suited to septic tank absorption fields.

This soil is in capability class I.

36B—Tama silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on side slopes and convex ridgetops on uplands. Areas are irregular in shape and range from 2 acres to several hundred acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is black and very dark grayish brown silt loam about 10 inches thick. The subsoil is about 42 inches thick. The upper part is dark yellowish brown, friable silty clay loam; the middle part is yellowish brown, friable silty clay loam; and the lower part is yellowish brown and very dark grayish brown silt loam. The substratum, to a depth of about 68 inches, is yellowish brown silt loam. In a few areas, the surface is thinner and darker colored than is typical. In some places, the substratum is brown or reddish brown, loam, clay loam, or sandy loam. In a few places in drainageways, the surface layer is thicker and darker colored. In some places, a clay loam buried soil is between depths of 40 and 60 inches. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Muscatine soils and poorly drained Drummer and Sable soils. These soils are in shallow depressions and drainageways and make up 2 to 10 percent of the unit.

This Tama soil has moderate permeability. Runoff from cultivated areas is medium, and available water capacity is very high. The surface layer is about 3.5 percent organic matter. The subsoil is medium acid. This soil has a high susceptibility to frost heave. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil reduces crusting and increases water infiltration.

This soil is suited to dwellings and septic tank absorption fields. Foundations need to be designed to over-

come the limitation of shrink-swell potential. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Damage to streets and roads from frost action can be reduced by replacing the base material.

This soil is in capability subclass IIe.

36C2—Tama silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex side slopes of uplands. Areas are irregular in shape and range from 2 to 50 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 40 inches thick. The upper part is dark brown, friable silty clay loam; the lower part is dark yellowish brown and yellowish brown, friable silty clay loam. The substratum, to a depth of about 60 inches, is brown and yellowish brown silt loam. In some places, the substratum is brown or reddish brown loam, clay loam, or sandy loam. Also, in areas where the upper part of the subsoil has been mixed with the former surface soil by plowing, the present surface layer is brown silty clay loam. A clay loam buried soil is between depths of 40 and 60 inches in some places. In some places, this soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Muscatine soils. These soils are in drainageways and make up 2 to 5 percent of the unit.

This Tama soil has moderate permeability. Runoff from cultivated areas is medium, and available water capacity is very high. The surface layer is about 3 percent organic matter. The subsoil is medium acid. The soil has a high susceptibility to frost heave. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for row crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil reduces crusting and increases water infiltration.

This soil is suited to dwellings when foundations are designed to overcome the shrink-swell potential. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Damage from frost action to roads and streets can be prevented by replacing base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIIe.

41—Muscatine silt loam. This nearly level, somewhat poorly drained soil is along drainage divides and drainageways on uplands. Areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is black silt loam about 9 inches thick. The subsoil is about 34 inches thick. The upper part is very dark grayish brown silty clay loam; the middle part is dark grayish brown, mottled silty clay loam; and the lower part is grayish brown, mottled silty clay loam. The substratum, to a depth of about 60 inches, is yellowish brown and light olive gray, mottled, friable silt loam. In some areas, the amount of sand throughout the profile is higher than is typical. Also, in places, mixed sandy loam and loam layers are in the substratum at a depth of less than 60 inches.

Included with this soil in mapping are small areas of poorly drained Drummer and Sable soils. These soils are in shallow depressions and drainageways and make up 2 to 10 percent of the unit. Also included are small areas of well drained Catlin and Tama soils. These soils are at slightly higher positions on the landscape than this Muscatine soil and are better drained. The Catlin and Tama soils make up 5 to 10 percent of the unit.

This Muscatine soil has moderate permeability. Surface runoff is slow, and available water capacity is very high. The surface layer is about 4.5 percent organic matter. The subsoil is medium acid to neutral. A seasonal high water table is at a depth of 2 to 4 feet. The soil has a high susceptibility to frost action. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Most areas are artificially drained. Minimum tillage and crop residue management help reduce soil losses from soil blowing and water erosion.

This soil is poorly suited to septic tank absorption fields because of the seasonal high water table. Lowering the water table by installing a subsurface drainage system helps to overcome this limitation. Sewage lagoons may seep, and there is a hazard of underground water pollution. Sealing the bottom of the lagoon helps prevent seepage. The soil is only moderately suited to dwellings without basements, but the foundations need to be designed to overcome the shrink-swell potential and improve drainage. It is poorly suited to dwellings with basements because of the seasonal high water table. Roads and streets are limited by high frost action and moderate shrink-swell potential. These limitations can be overcome if the base material is strengthened or replaced.

This soil is in capability class I.

55B—Sidell silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and broad side slopes. Areas are irregular in shape and range from 5 to 125 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsurface layer is very dark brown and very dark grayish brown silt loam and silty clay loam about 11 inches thick. The subsoil is about 42 inches thick. The upper part is dark brown or dark yellowish brown, friable silty clay loam; the middle part is yellowish brown, friable loam; and the lower part

is yellowish brown, firm clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous clay loam. In some places, the subsoil is thinner and shallower to calcareous material than is typical. In other areas, the subsoil contains more sand than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Rockton and Ripon soils and somewhat poorly drained Elburn soils. Rockton and Ripon soils are in similar positions on the landscape as Sidell soils and are about 30 inches deep to limestone bedrock. Elburn soils are in drainageways. They have a sandy or loamy substratum. These soils make up 10 to 15 percent of the unit.

This Sidell soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 3.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to medium acid. The shrink-swell potential is moderate in the subsoil. This soil has a high susceptibility to frost heave. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings when foundations are designed to overcome the shrink-swell potential. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Damage from frost action to streets and roads can be reduced by replacing the base material. The slow absorption of effluent is a limitation for septic tank absorption fields, but this can be overcome by increasing the size of the absorption area. Excessive seepage from sewage lagoons can be prevented by sealing the bottom of the lagoon.

This soil is in capability subclass IIe.

60C2—La Rose silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops, knolls, and short uneven side slopes. Areas are irregular in shape and range from 3 to 15 acres in size.

Typically, the surface layer is very dark grayish brown and dark brown silt loam about 8 inches thick. The subsoil is dark brown, friable clay loam about 12 inches thick. The substratum, to a depth of 60 inches, is brown, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. Also, in areas where the upper part of the subsoil has been mixed with the former surface layer by plowing, the present surface layer is dark brown clay loam. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Flanagan soils. These soils are in drainageways or on foot slopes and make up 2 to 10 percent of the unit.

This La Rose soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is mildly alkaline. Root development is restricted below a depth of about 24 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

This soil is suited to dwellings. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The slow absorption of effluent is a limitation for septic tank absorption fields, but this can be overcome by increasing the size of the absorption area. Slope limits use of this soil for sewage lagoons.

This soil is in capability subclass IIIe.

61—Atterberry silt loam. This nearly level, somewhat poorly drained soil is on broad stream terraces and upland plains. Areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam mixed with some dark brown silt loam and is about 6 inches thick. The subsurface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 36 inches thick. The upper part is mottled, dark grayish brown silty clay loam; the middle part is mottled, olive silty clay loam; and the lower part is olive gray, light olive gray, olive, and yellowish brown silty clay loam. The substratum, to a depth of about 60 inches, is yellowish brown silty clay loam. In some places, the surface layer is thicker than is typical. In a few places, the surface layer is light colored.

Included with this soil in mapping are small areas of well drained Downs and Fayette soils. These soils are at slightly higher positions on the landscape than the Atterberry soil and make up 2 to 10 percent of the unit.

This Atterberry soil has moderate permeability to moderately slow permeability. Surface runoff is slow, and

available water capacity is very high. The surface layer is about 3 percent organic matter. The subsoil is medium acid to strongly acid. The shrink-swell potential is moderate in the subsoil. The seasonal high water table is at a depth of 1 foot to 3 feet. The soil has a high susceptibility to frost heave. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Drainage may need to be installed in some places. Subsurface drainage systems work well. Tilling the soil when wet compacts the surface layer and degrades soil structure.

This soil is very poorly suited to dwellings and septic tank absorption fields because of the seasonal high water table.

This soil is in capability class I.

68—Sable silty clay loam. This nearly level, poorly drained soil is in depressions and drainageways on uplands. It is subject to occasional flooding for brief periods from March to June. Areas are irregular or linear in shape and range from 2 acres to more than 100 acres in size.

Typically, the surface layer is black silty clay loam about 6 inches thick. The subsurface layer is black and very dark gray silty clay loam about 14 inches thick. The subsoil extends to a depth of 60 inches. The upper part is olive gray, mottled, silty clay loam and the lower part is mottled gray and olive gray silt loam. In some places, sandy material is at a depth of less than 60 inches. Also, in some areas, the dark colored surface and subsurface layers are less than 12 inches thick.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry, Elburn, and Muscatine soils. These soils are in slightly higher positions on the landscape than the Sable soil. Also included are small areas of soils that have a sandy loam surface layer. The included soils make up about 2 to 10 percent of the unit.

This Sable soil has moderate permeability and frost action potential. Surface runoff from cultivated areas is slow to very slow or the soil is ponded, and available water capacity is very high. The seasonal high water table is at or near the surface. The surface layer is about 5.5 percent organic matter. It is sticky when wet, and it becomes cloddy if the soil is worked when wet. The subsoil is neutral. It has a moderate shrink-swell potential. Calcareous material is common in the substratum.

This soil is suited to corn and soybeans. It is also suited to, but seldom used for, hay and pasture. Drainage is needed for optimum yields, and subsurface drainage systems function satisfactorily where suitable outlets are available. Minimum tillage, crop management, and cover crops reduce soil blowing.

This soil generally is not suited to dwellings and onsite sewage disposal because of the seasonal high water table and occasional flooding and ponding.

This soil is in capability subclass IIw.

73—Ross loam. This nearly level, well drained soil is on flood plains along small streams and the Rock River. It is subject to frequent flooding for brief periods from November to June. Areas are irregular in shape and range from 3 to 50 acres in size.

Typically, the surface layer is black loam about 7 inches thick. The subsurface layer is very dark gray and very dark grayish brown loam about 25 inches thick. The subsoil is dark brown loam about 18 inches thick. The substratum, to a depth of 63 inches, is dark yellowish brown silt loam. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of poorly drained Comfrey and Sawmill soils and somewhat poorly drained Lawson and Orion soils. These soils are in lower positions on bottom lands than this Ross soil. They make up 5 to 12 percent of the unit.

This Ross soil has moderate permeability. Surface runoff is slow, and available water capacity is high. The surface layer is mildly alkaline and the subsurface layer is neutral. The surface layer is about 4 percent organic matter.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, flooding and deposits of additional soil can cover the plants. Protecting the soil from flooding and draining the surface minimize the damage to the crops. Soil erosion generally is not a major limitation unless the soil is disturbed and left bare and exposed for a considerable period of time.

Using this soil for pasture and hay effectively controls damage by flooding. When the soil is too wet, however, grazing causes very rough surfaces because livestock feet sink through the sod. Proper stocking, pasture rotation, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is generally not suited to dwellings and septic tank absorption fields because of frequent flooding.

This soil is in capability subclass IIIw.

74—Radford silt loam. This nearly level, somewhat poorly drained soil is on foot slopes and bottom lands along many smaller intermittent streams. It is subject to frequent flooding for brief periods from March to June. Areas are long and narrow in shape and range from 4 to 75 acres in size.

Typically, the surface layer is very dark gray silt loam about 18 inches thick. The substratum, to a depth of 60 inches, is very dark gray and dark grayish brown silt loam with thin, lighter colored parallel layers in the upper part. The lower part, a buried soil, is black silty clay loam. In some places, the surface layer is lighter in color and thicker to the substratum than is typical. In other areas, the soil has a thicker surface layer but does not have the buried soil.

Included with this soil in mapping are small areas of poorly drained Comfrey and Sawmill soils commonly in larger drainageways and on major flood plains. These

soils have a thicker surface layer and do not have a buried soil in the substratum. Comfrey soils are nearer streams and have more sand than this Radford soil. These soils make up 10 to 15 percent of the unit.

This Radford soil has moderate permeability. Surface runoff is slow, and available water capacity is very high. The surface layer is about 3 percent organic matter. The subsoil is mildly alkaline. The shrink-swell potential is moderate in the subsoil. The soil has a high frost action potential. Undrained areas have a seasonal high water table within 1 foot to 3 feet of the surface during the wet season, generally in spring. During flooding, silt can be deposited.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, flooding and deposits of additional soil can cover the plants. Protecting the area from flooding and draining wet areas by subsurface drains minimize the damage to the crops. Returning crop residue to the soil maintains fertility and reduces crusting. Soil blowing is a concern if the soil is disturbed and left bare and exposed for a considerable period of time.

Using this soil for pasture or hay effectively controls erosion damage by flooding. When the soil is too wet, however, grazing causes very rough surfaces because the feet of livestock sink through the sod. Proper stocking, pasture rotation, and restricted use during wet periods keep the pasture and soil in good condition. Forage yields are significantly increased by periodic applications of fertilizers and lime that are based on the soil requirement.

This soil is generally not suited to dwellings and septic tank absorption fields because of the frequent flooding.

This soil is in capability subclass IIw.

77—Huntsville silt loam. This nearly level, well drained soil is on flood plains along small streams and in drainageways. It is subject to occasional flooding for brief periods from April to June. Areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is about 41 inches thick. The upper part is very dark grayish brown and dark brown silt loam; the lower part is mixed very dark gray and very dark grayish brown silty clay loam. The subsoil, to a depth of 60 inches, is dark yellowish brown and yellowish brown silt loam. In some areas, the soil formed in loamy sediment. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson and Orion soils. These soils are in lower positions on similar landscapes and make up 2 to 10 percent of the unit.

The Huntsville soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is very high. Reaction is mildly alkaline. The surface layer is about 3.5 percent organic matter. The shrink-swell potential is moderate in the lower part of the subsurface layer. This soil has a high frost heave potential.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, flooding and deposits of additional soil can cover the plants. Protecting the area from flooding and artificially draining wet areas by subsurface drains minimize the damage to the crops. Soil erosion is a concern if the soils are disturbed and left bare and exposed for a considerable period of time.

Using this soil for pasture and hay effectively controls damage by flooding. When the soil is too wet, however, grazing causes very rough surfaces because the feet of livestock sink through the sod. Proper stocking, pasture rotation, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is generally not suited to dwellings and septic tank absorption fields because of the occasional flooding.

This soil is in capability subclass IIIw.

82—Millington silt loam. This nearly level, poorly drained soil is in depressional areas and on flood plains along streams and rivers. It is subject to frequent flooding for brief periods from April to June. Areas are irregular in shape and range from 10 to 80 acres in size.

Typically, the surface layer is black silt loam about 19 inches thick. The subsoil is very dark gray, friable loam about 19 inches thick. The substratum, to a depth of about 61 inches, is dark gray loam in the upper part and very dark gray, yellowish brown, and dark brown sandy loam and loamy sand in the lower part. In some places, the soil is noncalcareous. In a few areas, the surface layer and subsoil are sandy loam. In some places, the substratum contains gravel.

Included with this soil in mapping are small areas of very poorly drained Houghton soils. These soils are in shallow depressions and make up 2 to 5 percent of the unit.

This Millington soil has moderate permeability. The soil has a high frost action potential. Surface runoff from cultivated areas is slow to very slow or the soil is ponded, and available water capacity is very high. The soil is moderately alkaline. The availability of some micronutrients, such as iron, manganese, copper, and zinc, can be reduced by the moderately alkaline reaction. The seasonal high water table is within 2 feet of the surface. The surface layer is about 5 percent organic matter. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, and grass and legume hay and pasture. Adequate drainage is necessary, but outlets are limited and difficult to maintain. Flooding is also a hazard to early planted crops. The availability of some micronutrients can be low because of the high calcium content.

This soil also can be used for pasture. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper

stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is generally not suited to dwellings and septic tank absorption fields because of the seasonal high water table and the flooding hazard.

This soil is in capability subclass IIw.

87B—Dickinson sandy loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on low ridges shaped like dunes, on upland divides, and on stream terraces. Areas are irregular in shape and range from 2 acres to about 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable sandy loam about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown sandy loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is dark brown sandy loam and loamy sand; the lower part is dark yellowish brown loamy sand. The substratum, to a depth of 60 inches, is yellowish brown sand. In some places, the subsoil and substratum contain silty material. In some areas, the subsoil is sandier than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue and Millbrook soils. These soils are in shallow depressions and drainageways and they make up 2 to 10 percent of the unit.

This Dickinson soil has moderately rapid permeability in the subsoil and rapid permeability in the substratum. Surface runoff from cultivated areas is slow to medium, and available water capacity is low. The surface layer is about 3 percent organic matter. The subsoil is strongly acid to slightly acid.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Drought, soil blowing, and water erosion are hazards. Minimum tillage, cover crops, and returning crop residue to the soil and making regular additions of other organic material reduce soil erosion. Contour farming and stripcropping also help control soil blowing and water erosion and conserve moisture. Heavy fertilizer applications are generally not economical because crop growth is limited by low available water capacity. Early planting in the spring helps reduce the effect of summer drought.

This soil is suited to dwellings and septic tank absorption fields. Some caving of banks can be expected, but proper design and construction methods can overcome this limitation. When this soil is used for septic tank absorption fields, pollution of shallow underground aquifers is a possible hazard, because the underlying material is rapidly permeable. Lawns and shrubs need to be watered during dry periods.

This soil is in capability subclass IIe.

87C—Dickinson sandy loam, 5 to 12 percent slopes. This sloping, well drained soil is on side slopes of ridges shaped like dunes on uplands and on breaks of stream terraces. Areas are irregular in shape and range from about 2 to 40 acres in size.

Typically, the surface layer is very dark grayish brown, friable sandy loam about 7 inches thick. The subsurface layer is dark brown sandy loam about 3 inches thick. The subsoil is about 30 inches thick. The upper part is dark brown sandy loam and loamy sand, and the lower part is dark yellowish brown loamy sand. The substratum, to a depth of 60 inches, is yellowish brown sand. In some places, the subsoil and substratum are siltier than is typical. In some areas, the surface layer is loamy sand.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue and Millbrook soils. These soils are in drainageways and they make up 2 to 10 percent of the unit.

This Dickinson soil has moderately rapid permeability in the subsoil and rapid permeability in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 2 percent organic matter. The subsoil is strongly acid to slightly acid.

This soil is suited to small grain and grass and legume hay and pasture. This soil is poorly suited to corn and soybeans because of droughtiness, low fertility, and erosion hazard. Minimum tillage, cover crops, returning crop residue to the soil, and regular additions of organic matter maintains fertility and reduces water erosion and soil blowing. Contour farming, terracing, and stripcropping also help to control erosion and conserve moisture. Heavy applications of fertilizer are generally not economical because crop growth is limited by low available water capacity. Early planting of annual crops in spring helps the crop mature before summer drought becomes severe.

This soil is suited to pasture and hay. Overgrazing increases droughtiness and results in lower quality or death of existing forage and pasture. Proper stocking, pasture rotation, and timely deferment of grazing keep the pasture and soil in good condition.

This soil is suited to dwellings with or without basements and septic tank absorption fields. Rapidly permeable underlying material can create a pollution hazard for shallow underground aquifers when this soil is used for onsite sewage disposal. Lawns and shrubs need to be watered in dry periods.

This soil is in capability subclass IIIe.

88B—Sparta loamy sand, 0 to 6 percent slopes. This nearly level to gently sloping, excessively drained soil is on low, hummocky dunes on broad terraces of streams and on uplands. Areas are crescent or linear in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark gray loamy sand about 10 inches thick. The subsurface layer is very dark grayish brown loamy sand about 7 inches thick. The subsoil is about 14 inches thick. The upper part is dark yellowish brown, very friable sand; the lower part is brown, very friable sand. The substratum, to a depth of 60 inches, is reddish yellow, loose, medium and coarse sand. In some places, the surface layer contains more

clay and is lighter colored than is typical. Gravel is at a depth of less than 40 inches in some places.

Included with this soil in mapping are small areas of the somewhat excessively drained Eleva soils. This sandy soil has sandstone at a depth of 20 to 40 inches.

The Sparta soil has rapid permeability. Surface runoff is slow to medium, and available water capacity is low. The surface layer is about 2 percent organic matter. The subsoil is medium acid or strongly acid.

Most areas of this soil are cultivated. The soil is poorly suited to row crops. It is suited to Christmas tree production and is moderately suited to openland and woodland wildlife habitat. It is suited to dwellings and septic tank absorption fields.

This soil is poorly suited to row crops because of low available water capacity. Controlling soil blowing and maintaining soil fertility by additions of fertilizer are additional concerns. Leaving residue on the surface is effective in reducing soil blowing and conserving soil moisture.

Using this soil for Christmas tree production effectively controls soil blowing and conserves soil moisture. Seedling mortality is high as a result of droughtiness, but this can be reduced when competing vegetation is controlled or removed.

Using this soil for hay and pasture effectively controls soil blowing. Overgrazing results in poor vegetative growth and increased plant mortality. Proper stocking, pasture rotation, weed control, and timely deferment of grazing keep the pasture in good condition.

This soil is in capability subclass IVs.

102—La Hogue loam. This nearly level, somewhat poorly drained soil is on stream terraces, on outwash plains, and in upland drainageways. Areas are irregular in shape and range from 2 acres to several hundred acres in size.

Typically, the surface layer is black loam about 10 inches thick. The subsurface layer is very dark grayish brown and black loam about 8 inches thick. The subsoil is about 24 inches thick. The upper part is dark grayish brown clay loam; the middle part is grayish brown clay loam; and the lower part is olive gray silt loam. The substratum, to a depth of 62 inches, is mottled olive gray and light olive gray layers of silt loam, loam, sandy loam, and loamy sand. In some areas, the subsoil is thinner and shallower to calcareous material than is typical. In a few areas, loose sand is within a depth of 40 inches. In some areas, the surface layer is lighter colored.

Included with this soil in mapping are small areas of poorly drained Drummer and Selma soils. These soils are in depressions and at lower positions on the landscape than this La Hogue soil. These included soils make up 5 to 15 percent of the unit.

This La Hogue soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is very high. The seasonal high water table is within about 1 foot to 3 feet of the surface. The surface layer is about 3.5 percent organic matter. The shrink-swell potential is moderate in the subsoil. The soil has a high frost action potential.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Artificial drainage is needed in some areas to obtain optimum yields. Subsurface drainage functions satisfactorily, but because sandy layers are in the lower part of the subsoil in places, special design is necessary. Minimum tillage and cover crops help reduce soil blowing. Returning crop residue to the soil and regular additions of other organic material increase tilth and make seedbed preparation easier.

This soil is poorly suited to dwellings and septic tank absorption fields because of the seasonal high water table. Lowering the water table by installing subsurface drainage helps overcome this limitation.

This soil is in capability class I.

103—Houghton muck. This very poorly drained, organic soil is in swamps or bogs on flood plains along all major streams and many minor streams in the county. It is subject to frequent flooding for long periods from November to May. Areas are irregular in shape and are generally less than 10 acres in size. Frost mound features are evident where the soil is undrained and uncultivated.

Typically, the soil, to a depth of 60 inches, is black muck. In some places, the substratum is silt loam or loam.

Included with this soil in mapping are small areas of Comfrey loam. These mineral soils are on level flood plains and old oxbows. They make up 2 to 15 percent of the unit.

Houghton muck has moderately slow to moderately rapid permeability. Surface runoff from cultivated areas is very slow or the soil is ponded, and available water capacity is very high. The water table is at or near the surface throughout much of the year. When Houghton muck is drained, some subsidence occurs because of accelerated decomposition. Reaction is slightly acid to neutral. The organic matter content is about 20 percent. The soil has a high frost action potential.

Most areas of this soil have been drained to some degree and are used for cultivated crops. The soil is suited to specialty crops and common row crops. It is poorly suited to pasture, woodland, dwellings, and septic tank absorption fields. It is suited to wetland wildlife habitat.

This soil is suited to such specialty crops as potatoes, onions, and bulbous floral plants. Artificial drainage is required for farming. Gradual subsidence occurs after drainage, but this can be minimized by flooding the soil when it is not being cropped and by providing protection against soil blowing.

This soil is suited to wetland wildlife when undrained. Smartweed, wild millet, rushes, sedges, reeds, cordgrass, and cattail provide food and cover.

This soil is in capability subclass IIIw.

105B—Batavia silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on divides, interfluves, and side slopes on uplands. Areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsurface layer is dark grayish brown and very dark grayish brown silt loam about 4 inches thick. The subsoil is about 41 inches thick. The upper part is dark yellowish brown, friable silt loam; the middle part is dark yellowish brown and dark brown, friable silty clay loam; and the lower part is dark yellowish brown loam, clay loam, and silty loam. The substratum, to a depth of 60 inches, is stratified loam, clay loam, and silt loam. In some places, the surface layer and subsoil are thinner and the outwash is much closer to the surface than is typical. In other areas, the outwash is deeper than 60 inches. A clay loam buried soil is between depths of 40 and 60 inches in some places. In some places, the soil is well drained.

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

This Batavia soil has moderate permeability. Surface runoff is medium, and available water capacity is high. The surface layer is about 2.5 percent organic matter. The subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil. The soil has a high frost action potential.

This soil is suited to corn, soybeans, small grains, grasses, and legumes. Erosion is a hazard when the soil is used for row crops. Minimum tillage, contour farming, terraces, and crop residue management help reduce soil loss.

This soil is suited to dwellings when foundations are designed to overcome the shrink-swell potential. Local roads and streets are severely affected by frost action and low strength, but this limitation can be corrected by strengthening or replacing the base material. The soil is suited to septic tank absorption fields.

This soil is in capability subclass IIe.

107—Sawmill silty clay loam. This nearly level or depressional, poorly drained soil is in large, alluvial valleys and in smaller drainageways on uplands. It is subject to frequent flooding for brief periods from March to June. Areas are irregular in shape and range from 2 acres to several hundred acres in size.

Typically, the surface layer is black silty clay loam about 6 inches thick. The subsurface layer is black silty clay loam about 21 inches thick. The subsoil is about 19 inches thick. The upper part is mottled, gray silty clay loam; the lower part is gray, yellowish brown, and greenish gray silty clay loam. The substratum, to a depth of 60 inches, is mottled, greenish gray silty clay loam and silt loam. In some places, the dark colored surface layer is thinner than is typical, and in some places stratified sandy material is at a depth of less than 60 inches. In a few places, thin layers of silty overwash are on the surface.

Included with this soil in mapping are small areas of somewhat poorly drained Lawson, Orion, and Radford soils. These soils are adjacent to Sawmill soils and make up about 2 to 10 percent of the unit.

This Sawmill soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is very high. This soil is subject to a seasonal high water table within 2 feet of the surface. The surface layer is about 4.5 percent organic matter. It is sticky and becomes cloddy when worked while wet. The subsoil is slightly acid to mildly alkaline. Moisture content must be optimum before preparing a seedbed. This soil has a high frost action potential. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, and small grain. It is suited to, but seldom used for, hay and pasture. Drainage is needed for optimum yields. Many areas are surface drained by ditches. Subsurface drainage works satisfactorily if suitable outlets are available. Minimum tillage and cover crops help reduce soil blowing.

This soil is generally not suited to dwellings and septic tank absorption fields because of the seasonal high water table and frequent flooding.

This soil is in capability subclass IIw.

119C2—Elco silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on convex side slopes at the heads of upland drainageways. Areas are linear or oblong in shape and range from 2 to 20 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil is about 55 inches thick. The upper part is yellowish brown, friable silt loam and silty clay loam; the middle part is dark brown and very dark gray, friable silty clay loam and clay loam; and the lower part is mottled, dark grayish brown, olive brown, and grayish brown loam. In some places, the upper part of the subsoil is loam and clay loam. In some areas, the silty material is thicker. In a few areas, the slope is less than 5 percent.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Lawson soils. These soils are in shallow depressions and drainageways and make up 2 to 10 percent of the unit.

This Elco soil has moderate permeability in the upper part and moderately slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal water table is at a depth of 2.5 to 5 feet in spring. The surface layer is about 1.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid. This soil has a high frost action potential. The shrink-swell potential is moderate in the subsoil and underlying material.

This soil is suited for corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water intake.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, excessive runoff, and poor tilth. Pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings because of the shrink-swell potential, but foundations can be designed to overcome this limitation. The soil is poorly suited to septic tank absorption fields because of the moderately slow permeability in the lower part of the soil and the seasonal high water table. These limitations can be partly overcome by increasing the size of the absorption field. The seasonal high water table can be lowered by installing a subsurface drainage system.

This soil is in capability subclass IIe.

123—Riverwash. Riverwash consists of coarse, loose, sandy and gravelly material on natural levees along the major streams in the county. Large amounts of sand and gravel have been deposited over relatively small and irregular areas. Riverwash is subject to frequent flooding for long periods throughout the year. Many areas are along the streambank, and the size and shape of these areas can change entirely with each new flood.

Riverwash is not suited to farming, woodland, or building sites. Where this land is accessible, it is a source of local sand or gravel.

This soil is in capability class VIII.

125—Selma clay loam. This nearly level, poorly drained soil is on flats and in depressions of sandy outwash plains and stream terraces. It is subject to occasional flooding for brief periods in spring. Areas are irregular in shape and range from 6 to 550 acres in size.

Typically, the surface layer is black clay loam about 10 inches thick. The subsurface layer is black, very dark gray, and dark gray loam about 12 inches thick. The subsoil is about 23 inches thick. The upper part is gray, friable loam; the lower part is gray, stratified loam, clay loam, and sandy loam. The substratum, to a depth of about 60 inches, is gray, stratified loam and sandy loam that has a little gravel. In some places, the surface layer is calcareous and thicker to the substratum than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn, La Hogue, Odell, and Radford soils. These somewhat poorly drained soils are on foot slopes and other slightly higher areas within the map unit. Elburn and La Hogue soils have a sandy substratum. Odell soils have a loamy subsoil and substratum. Radford soils have silty alluvium over a dark colored, buried soil. These soils make up 10 to 15 percent of the unit.

This Selma soil has moderate permeability in the subsoil and moderate to moderately rapid permeability in the substratum. Surface runoff is very slow or the soil is ponded, and available water capacity is high. In undrained areas, the seasonal high water table is within 2 feet of the surface. The surface layer is about 5 percent organic matter. The subsoil is mildly alkaline, the shrink-swell potential is moderate, and the frost action potential is high.

This soil is used mainly for corn, soybeans, and some vegetable crops. If the soil is used for cultivated crops, protecting the area from flooding and maintaining artificial drainage minimize crop damage. Subsurface drainage works well where adequate outlets are available. Soil erosion is a limitation if the soil is left bare and exposed for a considerable period of time.

This soil is generally not suited to dwellings and septic tank absorption fields because of the seasonal high water table and occasional flooding.

This soil is in capability subclass IIw.

145B—Saybrook silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops and knolls and on broad divides on uplands. Areas are irregular in shape and range from 2 acres to about 200 acres in size.

Typically, the surface layer is very dark gray and very dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is very dark grayish brown and dark brown silt loam about 3 inches thick. The subsoil is about 23 inches thick. The upper part is brown silty clay loam, the middle part is grayish brown silty clay loam, and the lower part is yellowish brown loam. The substratum, to a depth of 60 inches, is brown, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. Also, in some places the surface layer is thinner, and in a few areas the upper part of the subsoil is clay loam. In some places, the soil is well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Flanagan soils. These soils are in depressions and drainageways and make up 5 to 10 percent of the unit.

This Saybrook soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal high water table is at a depth of 4 to 6 feet in spring. The surface layer is about 4 percent organic matter. It crusts and puddles after heavy rain. The subsoil is medium acid to slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is somewhat restricted below a depth of about 34 inches by calcareous, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Erosion is a hazard if

the soil is used for row crops. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains tilth, reduces crusting, and makes seedbed preparation easier.

This soil is only moderately suited to dwellings and septic tank absorption fields. Foundations of dwellings can be designed to overcome shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Frost action severely affects roads and streets, but this limitation can be reduced by replacing base material. Enlarging the absorption field and lowering the water table by subsurface drainage help to overcome the moderate permeability and wetness concerns for septic tank absorption fields.

This soil is in capability subclass IIe.

145C2—Saybrook silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on long, convex side slopes of ridges on uplands. Areas are irregular in shape and range from 2 to about 40 acres in size.

Typically, the surface layer is vary dark gray and very dark grayish brown, friable silt loam about 8 inches thick. The subsoil is about 21 inches thick. The upper part is brown silty clay loam, the middle part is grayish brown silty clay loam, and the lower part is yellowish brown sandy loam. The substratum, to a depth of 60 inches, is brown, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material. In places, the subsoil is mixed with the surface layer by plowing. In some areas, the upper part of the subsoil is clay loam. Also included are some areas that are well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Flanagan soils. These soils are in drainageways that finger into the uplands. They make up 5 to 10 percent of the unit.

This Saybrook soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal high water table is at a depth of 4 to 6 feet in spring. The surface layer is about 3.5 percent organic matter. It generally contains some subsoil material, and proper moisture content is critical to seedbed preparation. The subsoil is medium acid to slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is somewhat restricted below a depth of about 30 inches by calcareous, loamy glacial till. The soil has a high frost action potential.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Terraces and farming on the contour and conservation tillage, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil and making regular additions of other organic material maintain tilth, reduce crusting, and make seedbed preparation easier.

This soil is only moderately suited to dwellings. Foundations can be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength to support streets and sidewalks, but this limitation can be overcome by strengthening or replacing the base material. Frost action severely affects roads and streets, but this limitation can be reduced by replacing the base material. The soil is only moderately suited to septic tank absorption fields because of the permeability and wetness. Enlarging the absorption field and lowering the water table by subsurface drainage help to overcome the moderate permeability and the wetness concerns.

This soil is in capability subclass IIe.

152—Drummer silty clay loam. This nearly level or depressional, poorly drained soil is in depressions and drainageways on uplands and on outwash plains and stream terraces. It is subject to occasional flooding for brief periods in spring. Areas are irregular in shape and range from 2 to over 100 acres in size.

Typically, the surface layer is black silty clay loam about 8 inches thick. The subsurface layer is black silty clay loam about 4 inches thick. The subsoil is about 35 inches thick. The upper part is dark gray silty clay loam, the middle part is olive gray silty clay loam, and the lower part is olive gray silt loam. The substratum, to a depth of 60 inches, is olive gray and yellowish brown loam and silt loam. In some places, the silty material is thicker than is typical. The soil, in some places, has a thinner silty surface layer and contains more sand in the subsoil. Calcareous material is on the surface in some areas, the substratum is loamy glacial till in a few places.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn, La Hogue, and Odell soils. These soils are at slightly higher positions on the landscape than the Drummer soil and make up 5 to 15 percent of the unit.

This Drummer soil has moderate permeability. Surface runoff from cultivated areas is slow to very slow or the soil is ponded, and available water capacity is very high. A seasonal high water table is at or near the surface. The surface layer is about 6 percent organic matter. It is sticky when wet. It becomes cloddy, and seedbed preparation is difficult when the soil is wet during tillage. The subsoil is mildly alkaline. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn and soybeans. It is suited to, but seldom used for, grass and legume hay and pasture. Drainage is needed for optimum yields, and subsurface drainage functions satisfactorily where suitable outlets are available. Minimum tillage and cover crops help to reduce soil blowing.

This soil is poorly suited to dwellings and septic tank absorption fields. Lowering the water table and diverting

surface water helps overcome wetness and flooding limitations for dwellings without basements. The soil lacks sufficient strength and stability to support vehicular traffic. Suitable base material must be added during road and street construction. Sanitary facilities should be connected to commercial sewers.

This soil is in capability subclass IIw.

154A—Flanagan silt loam, 0 to 3 percent slopes. This nearly level to very gently sloping, somewhat poorly drained soil is on convex side slopes and along drainageways on uplands. Areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is black silt loam about 8 inches thick. The subsurface layer is very dark gray silty clay loam about 4 inches thick. The subsoil is about 40 inches thick. The upper part is dark grayish brown, mottled, friable silty clay loam; the middle part is grayish brown, mottled silty clay loam; and the lower part is mottled dark yellowish brown, yellowish brown, and greenish gray silty clay loam. The substratum, to a depth of 65 inches, is mottled yellowish brown and dark yellowish brown or greenish gray, calcareous silty clay loam till. In some places, the subsoil is thicker and deeper to calcareous material than is typical.

Included with this soil in mapping are small areas of poorly drained Drummer soils. Drummer soils are in drainageways and are underlain by outwash material. These soils make up 10 to 15 percent of the unit.

This Flanagan soil has moderate permeability. Surface runoff from cultivated areas is slow to medium, and available water capacity is very high. A seasonal high water table is within 1 foot to 3 feet of the surface. The surface layer is about 4.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to neutral. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material help maintain fertility, reduce crusting, and increase water infiltration. Proper placement of subsurface drainage systems helps overcome soil wetness.

This soil is poorly suited to dwellings and septic tank absorption fields. It is suited to dwellings without basements if foundations are designed to overcome the shrink-swell potential and wetness from the seasonal high water table. Damage from frost action and shrink-swell action to streets and roads can be reduced by replacing the base material. The moderately slow absorption of effluent and the seasonal high water table are limitations to septic tank absorption fields. These problems can be partly overcome by increasing the size of the absorption field and lowering the water table with a subsurface drainage system.

This soil is in capability class I.

171A—Catlin silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on broad, convex slopes. Areas are irregular in shape and range from 3 to 150 acres in size.

Typically, the surface layer is very dark brown silt loam about 11 inches thick. The subsoil is about 38 inches thick. The upper part is brown and dark brown, friable silty clay loam; the middle part is yellowish brown, dark brown, and light brownish gray, mottled, firm silty clay loam; and the lower part is dark yellowish brown, firm clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. In a few areas, the substratum is reddish loam or yellowish brown silt loam or silty clay loam. In some places, the soil is well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and Flanagan soils and poorly drained Drummer soils. These soils are in shallow depressions and drainageways, and they make up 10 to 15 percent of the unit.

This Catlin soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is high. A seasonal water table is at a depth of 3 to 6 feet in spring. The surface layer is about 3.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to medium acid. It has moderate shrink-swell potential. The frost action potential is high. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings and septic tank absorption fields. Foundations can be designed to overcome the shrink-swell potential. The soil lacks sufficient strength and stability to support vehicular traffic and frost action is a limitation but these limitations can be corrected by strengthening or replacing the base material. The seasonal high water table is a limitation to septic tank absorption fields, but this problem can be overcome by lowering the water table by subsurface drainage.

This soil is in capability class I.

171B—Catlin silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops and broad, even side slopes. Areas are irregular in shape and range from 5 to 150 acres in size.

Typically, the surface layer is very dark brown silt loam about 10 inches thick. The subsoil is about 36 inches thick. The upper part is brown and dark brown, friable silty clay loam; the middle part is yellowish brown, mottled, firm silty clay loam; and the lower part is dark yellowish brown, firm clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. In few areas, the substratum is reddish loam or yellowish brown silt loam. In some places the soil is well drained.

Included with this soil in mapping are small areas of moderately well drained Assumption soils. These soils are silty to a depth of about 30 inches over a gray, clay loam buried soil. They are in convex positions along drainageways. Also included are small areas of somewhat poorly drained Flanagan soils in drainageways. The included soils make up 10 to 15 percent of the unit.

This Catlin soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal high water table is at a depth of 3 to 6 feet in spring. The surface layer is about 3.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to medium acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, winter cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suitable for dwellings and septic tank absorption fields. Foundations can be designed to overcome the shrink-swell potential. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The seasonal high water table is a limitation for septic tank absorption fields. This problem can be overcome by lowering the water table by subsurface drainage.

This soil is in capability subclass IIe.

171C2—Catlin silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on convex ridgetops and knolls and on long, uneven side slopes. Areas are irregular in shape and range from 3 to 20 acres in size.

Typically, the surface layer is very dark brown silt loam about 8 inches thick. The subsoil is about 34 inches thick. The upper part is brown and dark brown, friable silty clay loam; the middle part is yellowish brown, mottled, firm silty clay loam; and the lower part is dark yellowish brown, firm clay loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam or slity clay loam. In some places, the subsoil is thinner and shallower to calcareous material than is typical. In areas where the upper part of the subsoil has been mixed with the former surface layer by plowing, the present surface layer is dark yellowish brown silty clay loam. In a few areas, the substratum is reddish loam or yellowish brown silt loam. In some places, this slope is well drained.

Included with this soil in mapping are small areas of moderately well drained Assumption soils. These soils are silty to a depth of about 30 inches over gray, clay loam buried soil. They are on convex positions along drainageways. Also included are small areas of somewhat poorly drained Flanagan soils in drainageways. These included soils make up 10 to 15 percent of the unit.

This Catlin soil has moderate permeability. Surface runoff from cultivated areas is medium and available water capacity is high. A seasonal high water table is at a depth of 3 to 6 feet in spring. The surface layer is about 3 percent organic matter. It is difficult to till when eroded. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to medium acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, contour farming, and terraces help prevent excessive soil loss (fig. 8). Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings and septic tank absorption fields. Foundations can be designed to overcome the shrink-swell potential. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The seasonal high water table is a limitation for septic tank absorption fields. This problem can be overcome by lowering the water table by subsurface drainage.

This soil is in capability subclass IIe.

175B—Lamont sandy loam, 1 to 5 percent slopes.

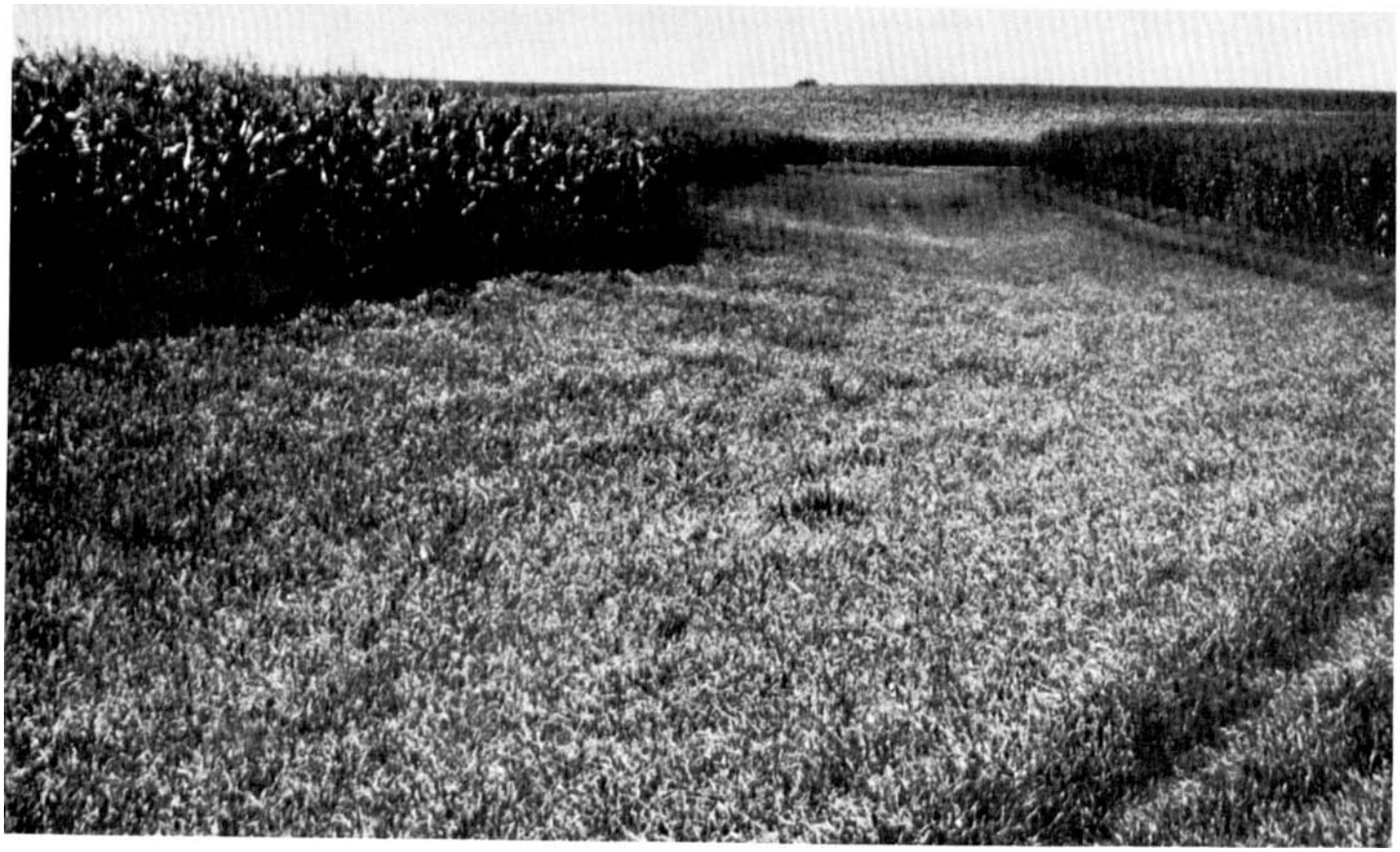

Figure 8.—Grassed waterway in Catlin silt loam, 5 to 10 percent slopes, eroded, helps prevent water erosion.

This gently sloping, well drained soil is on low ridges shaped like dunes that are on upland divides and stream terraces. Areas are irregular in shape and range from 2 to about 40 acres in size.

Typically, the surface layer is very dark gray, friable sandy loam about 5 inches thick. The subsoil is dark brown, dark yellowish brown, and yellowish brown sandy loam about 26 inches thick. The substratum, to a depth of 60 inches, is yellowish brown and yellow loamy sand and sand. In some places, the subsoil and substratum contain silty material. In some areas, the surface layer is thin and dark colored. In a few areas, the soil is sandier than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue and Millbrook soils. La Hogue and Millbrook soils are in shallow depressions and drainageways, and they make up 2 to 10 percent of the unit.

This Lamont soil has moderately rapid permeability in the upper part of the profile and very rapid in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 1.5 percent organic matter. It is subject to soil blowing when dry. The subsoil is neutral to medium acid.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Soil blowing and water erosion are hazards. Minimum tillage, cover crops, and returning crop residue to the soil and regular additions of other organic material reduce soil erosion and increase water intake. Contour farming and stripcropping also help control soil blowing and water erosion and conserve moisture. Heavy fertilizer applications are generally not economical because crop growth is limited by low available water capacity. Early planting in spring reduces the effect of summer drought.

This soil is suited to woodland and a few small areas remain in woodland. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling.

This soil is suited to dwellings and septic tank absorption fields. Some caving of banks can be expected, and proper design and construction methods can overcome this limitation. There is a hazard of pollution of shallow underground aquifers if the soil is used for septic tank absorption fields because the underlying material is rapidly permeable.

This soil is in capability subclass IIIe.

175C—Lamont sandy loam, 5 to 12 percent slopes. This sloping, well drained soil is on side slopes of ridges shaped like dunes and on uplands and on breaks of stream terraces. Areas are irregular in shape and range from about 2 to 25 acres in size.

Typically, the surface layer is dark grayish brown, friable sandy loam about 5 inches thick. The subsoil is dark yellowish brown sandy loam about 26 inches thick. The substratum, to a depth of 60 inches, is mottled, dark yellowish brown loamy sand and sand. In some places, the subsoil and substratum contain silty material. In some areas, the surface layer is thin and dark colored. In a few areas, the soil is sandier than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue and Millbrook. La Hogue and Millbrook soils are in drainageways, and they make up 2 to 10 percent of the unit.

This Lamont soil has moderately rapid permeability in the upper part of the profile and very rapid in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 1 percent organic matter. It is subject to soil blowing when dry. The subsoil is neutral to medium acid.

This soil is suited to small grain, grass and legume hay and pasture, and woodland. It is not well suited to corn and soybeans because of droughtiness, low fertility, and the hazard of erosion. Minimum tillage, cover crops, and returning crop residue to the soil and regular additions of organic matter improve fertility, reduce water erosion and soil blowing, and increase water intake. Contour farming, terracing, and stripcropping help to control erosion and conserve moisture. Heavy applications of fertilizer are generally not economical because crop growth is limited by low available water capacity. Early planting of annual crops in spring matures the crop before summer drought becomes severe.

This soil is suited to woodland. Few areas remain in native trees, but some areas have been planted to conifers. Protection from livestock, firebreaks, and light harvest cuttings which leave the forest intact are needed. Careful felling, skidding, and hauling protect desirable uncut trees, seedlings and shrubs.

This soil is suited to pasture and hay. Overgrazing increases droughtiness and results in lower quality or death of existing forage and pasture stands. Proper stocking, pasture rotation, and timely deferment of grazing keep the pasture and soil in good condition.

This soil is suited to dwellings, with or without basements, and to septic tank absorption fields. There is a hazard of pollution of shallow underground aquifers if this soil is used for septic tank absorption fields because the underlying material is rapidly permeable.

This soil is in capability subclass IIIe.

198—Elburn silt loam. This nearly level, somewhat poorly drained soil is on terraces and low areas of uplands. Areas are irregular in shape and range from 2 to 150 acres in size.

Typically, the surface layer is black silt loam about 13 inches thick. The subsurface layer is very dark gray and dark grayish brown silt loam about 8 inches thick. The subsoil is about 38 inches thick. The upper part is mottled, dark grayish brown silty clay loam; the middle part is grayish brown silty clay loam; and the lower part is grayish brown loam. The substratum, to a depth of 70 inches, is mottled gray, dark gray, and yellowish brown gravelly sandy loam. In some places, the underlying sandy material is deeper than is typical. In a few areas the surface layer is thinner than is typical.

Included with this soil in mapping are small areas of poorly drained Drummer and Sable soils. Sable soils do not have sandy layers in the lower part of the subsoil. Sable and Drummer soils are saturated with water for longer periods than this Elburn soil. The included soils are in small depressions and make up 5 to 10 percent of the unit.

This Elburn soil has moderate permeability. Surface runoff is slow, and available water capacity is very high. The seasonal water table is at a depth of 1 foot to 3 feet. The surface layer is 4.5 percent organic matter. The subsoil is neutral.

Most areas of this soil are cultivated. The soil is well suited to cultivated crops, hay, and pasture. It is poorly suited to dwellings and septic tank absorption fields.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Drainage is needed in some places, and subsurface drainage systems function well. Working the soil when wet causes a compacted surface layer and degrades soil structure.

This soil is poorly suited to dwellings and septic tank absorption fields because of the seasonal high water table. Lowering the water table by subsurface drainage helps overcome this limitation. Sanitary facilities should be connected to commercial sewers and treatment plants if possible.

This soil is in capability class I.

199A—Plano silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on broad, upland divides and on terraces along streams. Areas are linear in shape and range from 5 to 60 acres in size.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsurface layer is dark brown and very dark grayish brown silt loam about 5 inches thick. The subsoil is about 40 inches thick. The upper part is dark brown, firm silty clay loam; the middle part is dark yellowish brown, firm silty clay loam; and the lower part is brown and yellowish brown silt loam. The substratum, to a depth of 62 inches, is yellowish brown, stratified sandy loam and loam. In some places, the surface layer and subsoil are thinner and the outwash is much closer to the surface than is typical. The surface layer is thicker in depressions and drainageways. In some areas, the outwash is deeper than 60 inches. In some places, the soil is well drained.

Included with this soil are small areas of somewhat poorly drained Elburn soils. These soils are in shallow depressions and drainageways, and they make up 5 to 10 percent of the unit.

This Plano soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is high. The surface layer is about 4 percent organic matter. The subsoil is neutral or slightly acid. The frost action potential is high. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, small grain, grasses, and legumes. Minimum tillage, crop residue management, and cover crops help prevent soil loss from soil blowing.

This soil is suited to dwellings and septic tank absorption fields. The damage to roads and streets caused by frost action and low soil strength can be reduced by replacing the base material.

This soil is in capability class I.

199B—Plano silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on upland divides, interfluves, and side slopes. Areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsurface layer is dark brown and very dark grayish brown silt loam about 6 inches thick. The subsoil is about 39 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is dark yellowish brown silty clay loam; and the lower part is brown and yellowish brown loam. The substratum, to a depth of 62 inches, is yellowish brown, stratified loam and sandy loam. In some places, the surface layer and subsoil are thinner and the outwash is much closer to the surface than is typical. In some areas, the outwash is deeper than 60 inches. A clay loam buried older soil is at a depth of 40 to 60 inches in some places.

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

This Plano soil has moderate permeability. Surface runoff is medium, and available water capacity is high. The surface layer is about 4 percent organic matter. The subsoil is slightly acid or neutral. The frost action potential is high. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, grasses, and legumes. Erosion is a hazard if the soil is used for cultivated crops. Minimum tillage, contour farming, and terraces help keep soil losses to a minimum.

This soil is suited to dwellings and septic tank absorption fields. Local roads and streets are severely affected by frost action and soil strength, but these limitations can be corrected by strengthening or replacing the base material.

This soil is in capability subclass IIe.

199C2—Plano silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on upland side slopes and terrace breaks. Areas are linear in shape and range from 2 to 20 acres in size.

Typically, the surface layer is very dark gray silt loam about 8 inches thick. The subsoil is about 33 inches thick. The upper part is dark brown, firm silty clay loam; the middle part is dark yellowish brown, firm silty clay loam; and the lower part is brown and yellowish brown silt loam. The substratum is yellowish brown, stratified loam and sandy loam to a depth of 62 inches. In some places, the surface layer and subsoil are thinner and the outwash is much closer to the surface than is typical. A clay loam buried older soil is at a depth of 40 to 60 inches in some places.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn and well drained Ashdale soils. Elburn soils are in drainageways and make up 2 to 10 percent of the unit. Ashdale soils have bedrock at a depth of 40 to 60 inches and are on the steeper slopes along streams and rivers. These included soils make up 2 to 5 percent of the unit.

This Plano soil has moderate permeability. Surface runoff is medium, and available water capacity is high. The surface layer is difficult to till. It is 3.5 percent organic matter. The subsoil is slightly acid or neutral. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, grasses, and legumes. Erosion is a hazard if the soil is used for cultivated crops. Minimum tillage, contour farming, and terraces help keep soil losses to a minimum.

Using this soil for pasture effectively controls erosion. Overgrazing and poor weed control cause poor yields and increase the erosion hazard. Timely deferment of grazing, proper stocking, pasture rotation, and good weed control keep the pasture and soil in good condition.

This soil is suited to dwellings and septic tank absorption fields. Erosion is excessive when large areas of vegetative cover are removed during construction. Frost action and low soil strength cause damage to roads and streets. This can be prevented by strengthening or replacing the base material.

This soil is in capability subclass IIIe.

219—Millbrook silt loam. This nearly level to very gently sloping, somewhat poorly drained soil is on the upper reaches of upland drainageways and on terraces along streams. Areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsurface layer is grayish brown and dark grayish brown, mottled silt loam about 5 inches thick. The subsoil is about 43 inches thick. The upper part is grayish brown, mottled silty clay loam and clay loam; the middle part is grayish brown, yellowish brown, and strong brown, mottled clay loam and loam;

and the lower part is dark yellowish brown and yellowish brown, mottled sandy loam. The substratum, to a depth of 64 inches, is dark yellowish brown sandy loam. In some places, the subsoil is sandier and in other places more clayey than is typical. Also in some places, the subsurface layer is mixed with the surface layer by plowing.

Included with this soil in mapping are small areas of poorly drained Drummer soils and well drained Jasper soils. These soils are in higher, convex areas and make up 2 to 10 percent of the unit.

This Millbrook soil has moderate permeability or moderately slow permeability. Surface runoff from cultivated areas is slow to medium, and available water capacity is high. A seasonal high water table is within 1 foot to 3 feet of the surface. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is slightly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration. Proper placement of subsurface drainage helps overcome wetness.

This soil is suited to dwellings without basements if the proper design allows for soil wetness. It has fair to poor stability for vehicular traffic because it is limited by frost action, soil strength, and a seasonal high water table. These limitations can be corrected by strengthening or replacing the base material. The permeability and the seasonal high water table are limitations to septic tank absorption fields. These concerns can be partly overcome by increasing the size of the absorption field and installing subsurface drainage.

This soil is in capability class I.

221B—Parr loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on low ridges and convex side slopes. Areas are irregular in shape and range from 2 acres to more than 100 acres in size.

Typically, the surface layer is very dark brown loam about 7 inches thick. The subsurface layer is very dark brown and very dark grayish brown loam about 5 inches thick. The subsoil is dark yellowish brown and brown, friable clay loam about 17 inches thick. The substratum, to a depth of about 60 inches, is yellowish brown, calcareous loam. In a few places, the subsoil is thicker and deeper to calcareous loam than is typical. In some areas, the substratum is light yellowish brown, calcareous sandy loam, clay loam, or silty clay loam. In other areas, it is light yellowish brown, stratified sandy loam, loamy sand, or sand. In some places the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Odell soils and poorly drained Selma soils. These soils are in shallow depressions and drainageways, and they make up 2 to 8 percent of the unit.

This Parr soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 3 percent organic matter. It crusts or puddles, especially if wet when worked. The surface layer generally is slightly acid, depending upon local liming. The subsoil is medium acid or slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 28 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion is a hazard. Minimum tillage, contour farming, and terraces help reduce soil losses. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings. Foundations can be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. It is suited to septic tank absorption fields. The permeability concern for septic tank absorption fields can be overcome by increasing the size of the absorption field.

This soil is in capability subclass IIe.

221C2—Parr loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex side slopes. Areas are irregular in shape and range from 2 to 90 acres in size.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsoil is dark yellowish brown and brown, friable clay loam about 17 inches thick. The substratum, to a depth of about 60 inches, is yellowish brown, moderately alkaline loam. In a few places, the subsoil is thicker and deeper to calcareous loam than is typical. In some areas, the substratum is yellowish brown, calcareous sandy loam, clay loam, or silty clay loam. In a few places, the substratum is light yellowish brown, stratified sandy loam, loamy sand, or sand. Also, in areas where the upper part of the subsoil has been mixed with the former surface soil by plowing, the present surface layer is dark yellowish brown clay loam. Some areas are moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Odell soils. These soils are in small drainageways that finger into the Parr soil. They make up 2 to 4 percent of the unit.

This Parr soil has moderate permeability. Surface runoff from cultivated areas is medium and the available water capacity is high. The surface layer is about 2.5 percent organic matter. It is difficult to till when eroded. It crusts or puddles, especially when worked wet. The subsoil is medium acid or slightly acid. Root development is restricted below a depth of about 27 inches by compact, loamy glacial till. The shrink-swell potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, terraces, and cover crops help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods, keep the pasture and soil in good condition.

This soil is suited to dwellings. Foundations can be designed to overcome the shrinking and swelling of the soil. Slopes require alteration in some places. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Permeability is a limitation to septic tank absorption fields, but this problem can be overcome by increasing the size of the absorption field and installing filter lines on the contour.

This soil is in capability subclass IIIe.

223B—Varna silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops and broad side slopes. Areas are irregular in shape and range from 4 to 50 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsurface layer is very dark grayish brown silty clay loam about 5 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is brown, firm silty clay; and the lower part is brown, firm clay loam. The substratum, to a depth of 60 inches, is pale brown, calcareous clay loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan and Radford soils. The soils are in drainageways or low lying areas. They make up 2 to 10 percent of the unit.

This Varna soil has moderately slow permeability in the upper part of the subsoil and slow permeability in the lower part and in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is high. A perched seasonal high water table is at a depth of 3 to 6 feet. The surface layer is about 3.5 percent organic matter. It crusts after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to neutral. The shrink-swell potential is moderate in the subsoil. The frost action potential is high. Root development is restricted below a depth of about 36 inches by compact, clayey glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings without basements. Foundations can be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields. The moderately slow and slow permeability and a seasonal high water table are limitations to septic tank absorption fields, but they can be overcome by increasing the size of the absorption fields and draining the perched water table.

This soil is in capability subclass IIe.

223C2—Varna silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on short side slopes. Areas are irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is brown, firm silty clay; and the lower part is brown, firm clay loam. The substratum, to a depth of 60 inches, is pale brown, calcareous clay loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. In areas where the upper part of the subsoil is mixed with the former surface soil by plowing, the present surface layer is dark brown silty clay loam.

Included with this soil in mapping are small areas of somewhat poorly drained Flanagan and Radford soils. These soils are in drainageways or lower lying areas. They make up 2 to 10 percent of the unit.

This Varna soil has moderately slow permeability in the upper part of the subsoil and slow permeability in the lower part and the substratum. Surface runoff from cultivated areas is medium, and available water capacity is high. A perched seasonal high water table is at a depth of 3 to 6 feet. The surface layer is about 3 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to neutral. The shrink-swell potential is moderate in the subsoil. The frost action potential is high. Root development is restricted below a depth of about 36 inches by compact, clayey glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or the regular adding of other organic material

improves fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings without basements. Foundations can be designed to overcome the shrinking and swelling of the soil. Slopes require alteration in some places. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but this limitation can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields. The moderately slow and slow permeability and perched seasonal high water table are limitations for septic tank absorption fields, but they can be overcome by increasing the size of the absorption field and draining the water table.

This soil is in capability subclass IIIe.

233B—Birkbeck silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridgetops and broad, even side slopes. Areas are irregular in shape and range from 3 to 120 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown or dark brown silt loam about 7 inches thick. The subsoil is about 37 inches thick. The upper part is dark brown or dark yellowish brown, friable silty clay loam; the middle part is mottled, yellowish brown and grayish brown, friable silty clay loam; and the lower part is yellowish brown, mottled, friable loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous loam. In some places, the subsoil is thicker and deeper to calcareous material than is typical. The substratum is silty clay loam in a few places. In some places, the soil is well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall soils in drainageways. These soils make up 2 to 10 percent of the unit.

This Birkbeck soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal high water table is at a depth of 2.5 to 6 feet. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid to mildly alkaline. The shrink-swell potential is moderate in the subsoil. The frost action potential is high. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is only moderately suited to dwellings. Foundations can be designed to overcome the shrinking and swelling of the soil. If this soil is used for dwellings with basements, the water table needs to be lowered by subsurface drainage. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields because of the seasonal high water table, which can be lowered by subsurface drainage.

This soil is in capability subclass IIe.

233C2—Birkbeck silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on convex ridgetops and knolls and on short, uneven side slopes. Areas are irregular in shape and range from 4 to 25 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 34 inches thick. The upper part is dark brown or dark yellowish brown, friable silty clay loam; the middle part is dark brown, mottled, friable silty clay loam; and the lower part is yellowish brown, mottled, friable loam. The substratum, to a depth of 60 inches, is yellowish brown, moderately alkaline loam. In some places, the subsoil is thinner and shallower to calcareous material than is typical. Also, in areas where the upper part of the subsoil has been mixed with the former surface soil by plowing, the present surface layer is dark yellowish brown silty clay loam. In some areas, the substratum is reddish clay loam. In some places, the soil is well drained.

Included with this unit in mapping are small areas of Miami soils that have about 2 to 3 feet of loamy material over calcareous loam till. These soils make up 2 to 10 percent of the unit.

This Birkbeck soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal high water table is at a depth of 2.5 to 6 feet. The surface layer is about 1.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil ranges from strongly acid to mildly alkaline. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 50 inches by compact, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for

cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting or girdling. Slope is the main limitation to planting or harvesting trees.

This soil is only moderately suited to dwellings. Foundations can be designed to overcome the shrinking and swelling of the soil. If the soil is used for dwellings with basements, the water table needs to be lowered by subsurface drainage. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields because of the seasonal high water table, which can be lowered by subsurface drainage.

This soil is in capability subclass IIe.

242A—Kendall silt loam, 0 to 3 percent slopes. This nearly level to very gently sloping, somewhat poorly drained soil is on nearly flat uplands and upper reaches of drainageways. Areas are irregular to rounded in shape and range from 4 to 25 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is grayish brown and dark grayish brown silt loam about 6 inches thick. The subsoil is about 36 inches thick. The upper part is brown and dark brown, mottled, friable silty clay loam; the middle part is olive, olive gray, yellowish brown, and dark brown, mottled, friable silty clay loam; and the lower part is mottled yellowish brown and grayish brown, friable loam. The substratum, to a depth of about 61 inches, is yellowish brown and grayish brown silt loam and sandy loam. In a few areas, the subsoil is thinner than is typical. In places, the underlying material is at a depth of less than 40 inches.

Included with this soil in mapping are small areas of poorly drained Drummer and Sable soils. These dark colored soils are in shallow depressions and drainageways. They make up 5 to 10 percent of the unit.

This Kendall soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is high. A seasonal high water table is at a depth of 1 foot to 3 feet. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain and compacts if worked when wet. The subsoil is mildly alkaline to very strongly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legumes for hay and pasture. This soil can be artificially drained by subsurface drainage if suitable outlets are available. Returning crop residue to the soil or regular additions of other organic material maintains fertility and reduces crusting.

This soil is poorly suited to dwellings and septic tank absorption fields. Ths seasonal high water table can be lowered by subsurface drainage if adequate outlets are available. Frost action and soil strength severely affect streets and roads, but these limitations can be reduced by replacing base material.

This soil is in capability subclass IIw.

243A—St. Charles silt loam, 0 to 2 percent slopes. This nearly level, moderately well drained soil is on divides and foot slopes of uplands and on stream terraces. Areas are irregular in shape and range from 2 acres to more than 100 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 5 inches thick. The subsurface layer is brown and yellowish brown, friable silt loam about 9 inches thick. The subsoil, to a depth of about 60 inches, is yellowish brown silty clay loam in the upper part and yellowish brown loam and silt loam in the lower part. In some places, the lower part of the subsoil and the substratum contain gravel at a depth of less than 5 feet. Also, in some places, the upper part of the subsoil is loam or clay loam, or the subsoil formed entirely in silty material. In some places, the lower part of the subsoil contains reddish colored glacial material. In some places, the soil is well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall and Stronghurst soils and poorly drained Drummer soils. These soils are in drainageways and in lower positions on the landscape. They make up about 5 to 10 percent of the unit.

This St. Charles soil has moderate permeability. Surface runoff is slow, and available water capacity is high. A seasonal high water table is at a depth of 3 to 6 feet. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain. The subsoil is strongly acid. The frost action potential is high. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Minimum tillage and winter cover crops help keep erosion losses to a minimum. Returning crop residue to the soil or regular additions of other organic material maintains tilth, reduces crusting, and makes seedbed preparation easier.

This soil is only moderately suited to dwellings without basements and poorly suited to septic tank absorption fields because of the seasonal high water table. The seasonal high water table can be lowered by subsurface

drainage if suitable outlets are available. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material.

This soil is in capability class I.

243B—St. Charles silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on divides and foot slopes of uplands and on stream terraces. Areas are irregular in shape and range from about 2 to 80 acres in size.

Typically, the surface layer is very dark gray, friable silt loam about 4 inches thick. The subsurface layer is brown and yellowish brown, friable silt loam about 9 inches thick. The subsoil is about 44 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is pale brown, brown, yellowish brown, dark brown, and strong brown layers of loam, loamy sand, sandy loam, and silt loam. The substratum, to a depth of 60 inches, is dark brown sandy loam. In some places, the lower part of the subsoil and the substratum contain gravel at a depth of less than 5 feet. Also, in some places, the upper part of the subsoil is loam or clay loam, or the subsoil formed entirely in silty material. In some places, the lower part of the subsoil contains reddish colored glacial material. In some places, the soil is well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall and Stronghurst soils and poorly drained Drummer soils. These soils are in drainageways that finger into this map unit. They make up 5 to 10 percent of the unit.

This St. Charles soil has moderate permeability. Surface runoff is medium, and available water capacity is high. A seasonal high water table is at a depth of 3 to 6 feet. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain. The subsoil is strongly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If this soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains tilth, reduces crusting, and facilitates seedbed preparation.

This soil is only moderately suited to dwellings without basements and is poorly suited to septic tank absorption fields because of the seasonal high water table. It can be lowered by subsurface drainage if suitable outlets are available. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material.

This soil is in capability subclass IIe.

243C2—St. Charles silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on side slopes of ridges on uplands and on breaks of stream terraces. Areas are irregular in shape and range from 2 to about 80 acres in size.

Typically, the surface layer is dark grayish brown and brown silt loam about 7 inches thick. The subsoil is about 40 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is dark brown and yellowish brown layers of loam, loamy sand, sandy loam, and silt loam. The substratum, to a depth of 60 inches, is dark brown gravelly loamy sand. In some places, the upper part of the subsoil formed entirely in silty material, or calcareous material is within a depth of 40 inches. In some places, the upper part of the subsoil has been mixed with the surface soil by plowing. In some places, the soil is well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Kendall, Orion, and Stronghurst soils and poorly drained Comfrey soils. These soils are in drainageways and make up 5 to 10 percent of the unit.

This St. Charles soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. A seasonal high water table is at a depth of 3 to 6 feet. The surface layer is about 1.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legumes for hay and pasture. If this soil is used for cultivated crops, further erosion damage is a hazard. Minimum tillage, terracing, and contour farming help keep erosion losses within acceptable limits. Cover crops and returning crop residue to the soil and regular additions of other organic material maintain fertility and reduce crusting and erosion.

This soil is suited to woodland. Although most areas have been cleared, some remain in native hardwoods. Where possible, harvest cuttings should be light to leave the forest intact. Careful felling, skidding, and hauling protect desirable uncut trees, seedlings, and shrubs. Protection from livestock and by firebreaks are needed.

Growing pasture or hay effectively reduces erosion. Controlled grazing, fertilization, and weed control are important in management and treatment.

This soil is only moderately suited to dwellings without basements and is poorly suited to septic tank absorption fields because of the seasonal high water table. The seasonal high water table can be lowered by subsurface drainage if suitable outlets are available. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material.

This soil is in capability subclass IIIe.

259B—Assumption silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on

convex side slopes at the heads of upland drainageways. Areas are long and range from 2 to 20 acres in size.

Typically, the surface layer is very dark gray silt loam about 9 inches thick. The subsurface layer is very dark grayish brown silt loam about 3 inches thick. The subsoil is about 48 inches thick. The upper part is yellowish brown, friable silty clay loam and silt loam; the middle part is very dark gray and very dark grayish brown silty clay loam; and the lower part is mottled grayish brown and gray, friable clay loam. In some areas slope is less than 2 percent or more than 6 percent. In some areas, the surface layer is thicker, and in other places, the silty material is thicker than is typical. In some places, the upper part of the subsoil is loam or clay loam, or the lower part of the subsoil contains reddish colored glacial material.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Lawson soils. These soils are in shallow depressions and drainageways, and they make up 2 to 10 percent of the unit.

This Assumption soil has moderate permeability in the upper part and moderately slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is high. A perched seasonal high water table is at a depth of 3 to 4.5 feet. In wet years, seepage is a concern in spring. The surface layer is about 3.5 percent organic matter. It is friable but is difficult to till when wet. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water intake.

This soil is only moderately suited to dwellings because of the shrinking and swelling of the soil and the seasonal high water table. Foundations can be designed to overcome the shrink-swell potential. The perched seasonal high water table is a limitation to dwellings with basements but can be overcome by installing subsurface drainage if suitable outlets are available.

This soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields because of the moderately slow permeability in the lower part and the perched seasonal high water table; these limitations can be partly overcome by increasing the size of the absorption field and using subsurface drainage if suitable outlets are available.

This soil is in capability subclass IIe.

259C2—Assumption silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on convex side slopes at the heads of upland drainageways. Areas are linear or oblong in shape and range from 2 to 20 acres in size.

Typically, the surface layer is very dark gray and yellowish brown silt loam about 9 inches thick. The subsoil is about 54 inches thick. The upper part is yellowish brown, friable silty clay loam and silt loam; the middle part is very dark gray and very dark grayish brown silty clay loam; and the lower part is mottled, grayish brown and gray, friable clay loam. In some less eroded places, the surface layer is thicker. In places, the silty material is thicker than is typical. In some places, the upper part of the subsoil is loam or clay loam, or the lower part contains reddish colored glacial material.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Lawson soils. These soils are in shallow depressions and drainageways, and they make up 2 to 10 percent of the unit.

This Assumption soil has moderate permeability in the upper part and moderately slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is high. A perched seasonal high water table is at a depth of 3 to 4.5 feet. In wet years, seepage is a concern in spring. The surface layer is about 3 percent organic matter. It is difficult to till and crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is strongly acid. In addition, the shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water intake.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet causes surface compaction, excessive runoff, and poor tilth. Pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings because it shrinks and swells and has a seasonal high water table. Foundations can be designed to overcome the shrink-swell potential. The perched seasonal high water table can be overcome by subsurface drainage if suitable outlets are available.

This soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The soil is poorly suited to

septic tank absorption fields because of the moderately slow permeability in the lower part and the perched seasonal high water table. These limitations can be partly overcome by increasing the size of the absorption field and using subsurface drainage if a suitable outlet is available.

This soil is in capability subclass IIe.

278A—Stronghurst silt loam, 0 to 3 percent slopes. This nearly level to very gently sloping, somewhat poorly drained soil is on broad divides on uplands and on stream terraces. Areas are irregular in shape and range from 2 to about 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 7 inches thick. The subsurface layer is grayish brown, friable silt loam about 4 inches thick. The subsoil is about 44 inches thick. The upper part is brown silty clay loam; the middle part is grayish brown, yellowish brown, and light olive brown silty clay loam; and the lower part is mottled grayish brown, light olive brown, and light brownish gray silt loam. The substratum is mottled light olive brown and light brownish gray silt loam. In some places, the subsurface layer is mixed with the surface layer by plowing. In other places, stratified sandy material is at a depth of less than 5 feet.

Included with this soil in mapping are small areas of poorly drained Sable soils. Also included are better drained Fayette, Flagg, and Rozetta soils in higher positions on the landscape. These soils make up 2 to 10 percent of the unit.

This Stronghurst soil has moderate permeability to moderately slow permeability. Surface runoff from cultivated areas is slow, and available water capacity is very high. The surface layer is 2 percent organic matter. It crusts or puddles after hard rain. The subsoil is medium acid to strongly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Minimum tillage and winter cover crops help reduce erosion. Returning crop residue to the soil and regular additions of other organic material maintain tilth, reduce crusting, and make seedbed preparation easier.

This soil is poorly suited to dwellings and septic tank absorption fields because of the seasonal high water table which causes wet basements and failure to absorb effluent. The seasonal high water table can be lowered by subsurface drainage if suitable outlets are available. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. Installing a central sewage treatment facility overcomes the seasonal high water table limitation for septic tank absorption fields.

This soil is in capability subclass IIw.

279A—Rozetta silt loam, 0 to 3 percent slopes. This nearly level and very gently sloping, moderately well drained soil is on broad divides of uplands and on stream terraces. Areas are irregular in shape and range from 2 acres to about 100 acres in size.

Typically, the surface layer is dark grayish brown, friable silt loam about 8 inches thick. The subsurface layer is dark brown, friable silt loam about 4 inches thick. The subsoil is silty clay loam about 37 inches thick. The upper part is dark yellowish brown, the middle part is yellowish brown, and the lower part is mottled, dark yellowish brown, brown, and grayish brown. The substratum, to a depth of 60 inches, is yellowish brown silt loam. In some places, the subsurface layer is mixed with the surface layer by plowing. In some places, stratified sandy material or reddish colored glacial drift is at a depth of less than 5 feet.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Stronghurst soils. These soils are in shallow depressions and drainageways, and they make up 2 to 10 percent of the unit.

This Rozetta soil has moderate permeability. Surface runoff from cultivated areas is slow to medium, and available water capacity is very high. A seasonal high water table is at a depth of 3 to 4 feet. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain. The subsoil is medium acid to strongly acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Minimum tillage and winter cover crops help reduce erosion. Returning crop residue to the soil and regular additions of other organic material maintain tilth, reduce crusting, and make seedbed preparation easier.

This soil is only moderately suited to dwellings. Foundations can be designed to overcome the shrinking and swelling of the soil. The seasonal high water table is a limitation for dwellings with basements but can be overcome by subsurface drainage if suitable outlets are available. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields because of the seasonal high water table. This limitation can be overcome by installing subsurface drainage if suitable outlets are available or by using a central sewage treatment facility.

This soil is in capability class I.

280B—Fayette silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls and on foot slopes of uplands and on terraces. Areas are irregular in shape and range from 2 to 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil is about 43 inches thick. The upper part is yellowish brown and dark yellowish brown silty clay loam, and the

lower part is dark yellowish brown, yellowish brown, and brownish yellow silt loam. The substratum, to a depth of 60 inches, is brown, yellowish brown, and brownish yellow silt loam. In some places, gray mottles are at a depth of less than 30 inches. In some areas, stratified sandy material or clay loam glacial material is within 60 inches, and in some places, calcareous material is at a depth of less than 40 inches. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Stronghurst soils. These soils are in shallow depressions and drainageways, and they make up 2 to 5 percent of the unit.

This Fayette soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is very high. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain. The subsoil is medium acid or strongly acid. The shrink-swell potential is moderate in the subsoil and underlying material. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If this soil is used for cultivated crops, erosion is a hazard. Minimum tillage, contour farming, and cover crops help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation, or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is suited to dwellings and septic tank absorption fields. Foundations can be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength to support vehicular traffic and is limited by frost action. Strengthening or replacing the base material helps overcome these limitations to roads and streets.

This soil is in capability subclass IIe.

280C2—Fayette silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on ridges and side slopes of uplands and on stream terraces. Areas are linear or irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is yellowish brown silt loam. The underlying material is yellowish brown and gray silt loam. In some places, gray mottles are at a depth of less than 30 inches. In some places the surface layer is thinner as a result of erosion, and the subsoil is mixed into the surface layer by plowing. Also, in some places the surface layer is thicker than is typical, especially in areas in woodland. In places, stratified material, clay loam glacial material, or bedrock is within a depth of 60 inches, and in some places, calcareous material is at a depth of less than 40 inches. In some areas, slope is more than 10 percent. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Stronghurst soils and poorly drained Comfrey soils. These soils are in drainageways and finger into the Fayette soils. They make up 5 to 10 percent of the unit.

This Fayette soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is very high. The surface layer is about 1.5 percent organic matter. It is difficult to work, and it crusts or puddles after hard rain. The subsoil is medium acid or strongly acid. The shrink-swell potential is moderate in the subsoil and underlying material. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Erosion is a continuing hazard. Minimum tillage combined with contour farming or terracing allow intensive cropping systems while keeping soil losses within acceptable limits. Using cover crops and returning crop residue to the soil and making regular additions of other organic material maintain fertility and reduce crusting and erosion.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Growing pasture or hay effectively reduces erosion. Controlled grazing, fertilization, and weed control are essential management and treatment needs.

This soil is suited to dwellings and septic tank absorption fields. Foundations can be designed to overcome the shrinking and swelling of the soil. Damage from soil strength and frost action to streets and roads can be reduced by replacing the base material.

This soil is in capability subclass IIIe.

280D2—Fayette silt loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on ridges and side slopes of uplands and on stream terraces. Areas are linear or irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish brown silty clay loam, and the lower part is yellowish brown silt loam. The underlying material is yellowish brown and gray silt loam. In some places, gray mottles are at a depth of less than 30 inches. In some places, the surface layer is thinner as a result of erosion, and the subsoil is mixed into the surface layer by plowing. Also, in places, the surface layer is thicker than is typical, especially in woodland. In some areas, stratified material, clay loam glacial material, or

bedrock is within a depth of 60 inches, or calcareous material is at a depth of less than 40 inches. In some areas, slope is more than 15 percent, or the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Atterberry and Stronghurst soils and poorly drained Comfrey soils. These soils are in drainageways and finger into the Fayette soils. They make up 5 to 10 percent of the unit.

This Fayette soil has moderate permeability. Surface runoff from cultivated areas is rapid, and available water capacity is very high. The surface layer is about 1.5 percent organic matter. It is difficult to work. It crusts or puddles after hard rain. The subsoil is medium acid or strongly acid. In addition, the shrink-swell potential is moderate in the subsoil and in the underlying material. The frost action potential is high.

Some areas of this soil are cultivated. The soil is moderately suited to row crops, hay, and pasture, but it is well suited to woodland. It is moderately suited to dwellings and septic tank absorption fields.

If this soil is used for cultivated row crops or grain, erosion is a continuing hazard. Minimum tillage, combined with contour farming or terracing, allows intensive cropping systems and keeps soil losses within acceptable limits. Planting cover crops and returning crop residue to the soil and making regular additions of other organic material improve fertility and reduce crusting and erosion.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Proper stocking, pasture rotation, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings, but foundations need to overcome the shrinking and swelling of the soil. The slope may require alteration also. The soil lacks sufficient strength for vehicular traffic and is limited by frost action. Strengthening or replacing the base material helps overcome these limitations to roads and streets. Placing septic tank absorption fields on the contour helps overcome the limitation of slope.

This soil is in capability subclass IIIe.

290B—Warsaw loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on convex ridges on outwash plains, gravelly kames, and terraces of streams and rivers. Areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark brown loam about 6 inches thick. The subsurface layer is very dark brown and very dark grayish brown loam about 10 inches thick. The subsoil is about 20 inches thick. The upper part is dark yellowish brown, friable sandy loam and sandy clay loam; the lower part is yellowish brown sandy clay loam and sandy loam. The substratum, to a depth of about 60 inches, is yellowish brown, moderately alkaline sand and gravel. In places, the subsoil is thicker and deeper to sand and gravel than is typical. In a few areas, the surface layer is very dark gray sandy loam or loamy sand.

Included with this soil in mapping are small areas of well drained Jasper soils. These soils are in similar positions on the landscape, and they make up 2 to 4 percent of the unit.

This Warsaw soil has moderate permeability in the upper part and very rapid permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 3 percent organic matter. The subsoil is medium acid to moderately alkaline. Root development is restricted by calcareous sand and gravel below a depth of about 36 inches.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Winter cover crops help prevent excessive soil blowing.

This soil is suited to dwellings and septic tank absorption fields. The very rapidly permeable underlying material creates a pollution hazard for shallow underground aquifers if the soil is used for onsite sewage disposal. This soil is well suited as a source of sand, gravel, and topsoil.

This soil is in capability subclass IIe.

294B—Symerton loam, 1 to 5 percent slopes. This nearly level to gently sloping, well drained soil is in rounded and slightly higher parts of till plains. Areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark brown loam about 10 inches thick. The subsurface layer is very dark grayish brown loam about 7 inches thick. The subsoil is about 36 inches thick. The upper part is dark yellowish brown sandy clay loam, the middle part is yellowish brown silty clay loam, and the lower part is yellowish brown clay loam. The substratum, to a depth of 60 inches, is light yellowish brown, moderately alkaline clay loam. In some places, the subsoil is thicker and deeper to calcareous silty clay loam than is typical. In other areas, the subsoil is thinner and shallower to calcareous silty clay loam than is typical. In a few areas, sandy layers are below a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained La Hogue soil. This soil is on slightly lower parts of the landscape, and it makes up 10 to 15 percent of the unit.

This Symerton soil has moderate permeability in the upper part of the subsoil and moderately slow in the lower part. Surface runoff is medium, and available water capacity is high. The surface layer is about 3.5 percent organic matter. It crusts or puddles after hard rain. The subsoil ranges from medium acid to mildly alkaline. The

shrink-swell potential is moderate in the subsoil and underlying material.

This soil is suited to corn, soybeans, small grain, and grass and legume hay. If the soil is used for cultivated crops, damage by water erosion is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings, but foundations need to be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields because of the permeability. If septic tank absorption fields are installed, the size of the absorption area can be increased to allow for the moderately slow permeability of the lower part of the subsoil.

This soil is in capability subclass IIe.

294C2—Symerton loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on rounded, slightly higher parts of till plains. Areas are irregular in shape and range from 2 to 80 acres in size.

Typically, the surface layer is very dark brown loam about 8 inches thick. The subsurface layer is very dark grayish brown loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown sandy clay loam, the middle part is yellowish brown silty clay loam, and the lower part is yellowish brown clay loam. The substratum, to a depth of 60 inches, is light yellowish brown moderately alkaline clay loam. In places, the subsoil is thicker and deeper to calcareous silty clay loam. In other areas, the subsoil is thinner and shallower to calcareous silty clay loam. In few areas, sandy layers are below a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained La Hogue soil. This soil is in slightly lower positions of the landscape, and it makes up 10 to 15 percent of the unit.

This Symerton soil has moderate permeability in the upper part of the subsoil and moderately slow permeability in the lower part of the subsoil. Surface runoff is medium, and available water capacity is high. The surface layer is about 3 percent organic matter. It is difficult to till when eroded. It crusts or puddles after hard rain. The subsoil ranges from medium acid to mildly alkaline. The shrink-swell potential is moderate in the subsoil and substratum.

This soil is suited to corn, soybeans, small grain, and grass and legume hay. If the soil is used for cultivated crops, damage by water erosion is a hazard. Minimum tillage, contour farming, cover crops and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings, but foundations need to be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is poorly suited to septic tank absorption fields because of the permeability. If septic tank absorption fields are installed, the size of the absorption area can be increased to allow for the moderately slow permeability of the lower part of the subsoil.

This soil is in capability subclass IIIe.

321—Du Page silt loam. This nearly level, well drained soil is on flood plains and on islands in the Rock River. It is subject to rare flooding. Areas tend to be long in shape and range from 3 to 40 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is black, very dark gray, and very dark grayish brown silt loam and loam about 33 inches thick. The substratum, to a depth of 60 inches, is brown and dark brown, stratified loam, sandy loam, and loamy sand. It is calcareous throughout. In places, the surface layer is lighter colored than is typical and contains no free lime. Also, in some places the entire soil contains no free lime.

Included with this soil in mapping are small areas of Comfrey, Lawson, and Millington soils. These alluvial soils are similar to this Du Page soil and are on bottom land. Comfrey and Millington soils are poorly drained and loam. Lawson soils are somewhat poorly drained and silty. These soils make up 10 to 15 percent of the unit.

This Du Page soil has moderate permeability. Surface runoff from cultivated areas is slow to medium, and available water capacity is high. The surface layer is about 4 percent organic matter. The subsoil is mildly alkaline or moderately alkaline. The shrink-swell potential is low in the subsoil.

Most areas of this soil are covered with brush and trees. Some areas that are accessible to agricultural machinery are cultivated. This soil is suited to row crops, hay, pasture, and trees. It is poorly suited to dwellings because of the rare flooding.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. When the soil is used for cultivated crops, protection from flooding and draining trapped overflow water minimize crop damage. The high lime content of the soil causes a decrease in phosphorus available for crops. This hazard can be minimized by side dressing the crops with a fertilizer that is high in phosphorus and planting crops that are tolerant to a high content of lime. Soil erosion is a concern if the soil is disturbed and left bare and exposed for a considerable period of time or if the soil is used as a water course.

This soil is suited to woodland and openland wildlife habitat. Most areas are in brush or hardwood trees and are inaccessible to farming or commercial timber operations because they are on islands in the Rock River.

This soil is in capability subclass IIw.

324B—Ripon silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridgetops, knolls, and short side slopes. Areas are irregular in shape and range from 4 to 40 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsurface layer is dark brown silt loam about 4 inches thick. The subsoil is silty clay loam about 24 inches thick. The upper part is dark brown, and the lower part is dark yellowish brown and friable. Limestone bedrock is at a depth of about 35 inches. In places, the subsoil is thicker than is typical and deeper to bedrock. The bedrock crops out and is exposed in places.

Included with this soil in mapping are small areas of Catlin and Plano soils. In Catlin soils, the silty material is over loamy glacial till. In Plano soils, the silty material is over stratified sandy material. These soils make up 10 to 15 percent of the unit.

This Ripon soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 4 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid or medium acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 31 inches by limestone bedrock. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is only moderately suited to dwellings without basements because of the shrink-swell potential and depth to bedrock. Foundations can be designed to overcome these limitations. Damage from soil strength and frost action to streets and roads can be reduced by replacing the base material. The soil is poorly suited to septic tank absorption fields. Effluent from septic tank absorption fields can contaminate ground water supplies as a result of the infiltration in limestone bedrock. Community sewage treatment facilities overcome this limitation. The underlying limestone bedrock is a good source of agricultural lime and crushed rock.

This soil is in capability subclass IIe.

324C2—Ripon silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on ridgetops, knolls, and short side slopes. Areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is about 24 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is dark yellowish brown silty clay loam; and the lower part is dark yellowish brown, friable clay loam. Limestone bedrock is at a depth of about 31 inches. In places, the subsoil is thicker and deeper to bedrock than is typical. In areas where the upper part of the subsoil has been mixed with the former surface soil by plowing, the present surface layer is dark yellowish brown silty clay loam. The bedrock is exposed in places.

Included with this soil in mapping are small areas of well drained Plano soils. These soils have a layer of outwash to a depth of 60 inches over bedrock. Also included are soils where slope is more than 10 percent. These soils make up 10 to 15 percent of the unit.

This Ripon soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is low The surface layer is about 3.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid or medium acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 30 inches by limestone bedrock. The frost action potential is high.

Most areas of this soil are cultivated. This soil is suited to row crops, hay, pasture, and trees. It is moderately suited to dwellings without basements. It is poorly suited to dwellings with basements and septic tank absorption fields.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings without basements because of the shrink-swell potential and depth to bedrock, but foundations can be designed to overcome these limitations. Damage from soil strength and frost action to streets and roads can be reduced by replacing the base material. The soil is poorly suited to septic tank absorption fields. Effluent from septic tank absorption fields can contaminate ground water supplies as a result of rapid infiltration in the limestone bedrock. Using a community sewage treatment facility can overcome this limitation. The underlying limestone bedrock is a good source of agricultural lime and crushed rock.

This soil is in capability subclass IIIe.

327B—Fox loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on convex ridges on outwash plains, gravelly kames, and stream terraces. Areas are irregular in shape and range from 3 to 60 acres in size.

Typically, the surface layer is very dark grayish brown loam about 5 inches thick. The subsoil is about 28 inches thick. The upper part is dark yellowish brown loam, and the lower part is dark brown gravelly clay loam. The substratum, to a depth of 60 inches, is dark brown and light yellowish brown, moderately alkaline sand and gravel. In some places, the subsoil is thicker and deeper to sand and gravel than is typical.

Included with this soil in mapping are small areas of well drained Martinsville and Rodman soils. In Martinsville soils, loamy material is over sand and silt. In Rodman soils, less than 15 inches of loamy material is over sand and gravel. These soils make up 10 to 15 percent of the unit.

Permeability is moderate in the subsoil and rapid in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 2 percent organic matter. The subsoil ranges from neutral to mildly alkaline. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 36 inches by calcareous sand and gravel.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, water erosion and soil blowing are hazards. Minimum tillage, contour farming, and terraces help reduce soil losses from erosion. Winter cover crops help prevent excessive soil blowing.

This soil is suited to dwellings and septic tank absorption fields. Foundations can be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The rapidly permeable underlying material can create a pollution hazard for shallow underground aquifers if this soil is used for septic tank absorption fields. The soil is suitable as a source of sand, gravel, and topsoil.

This soil is in capability subclass IIe.

347—Canisteo clay loam. This nearly level, poorly drained soil is in flat, shallow depressions on outwash plains and along drainageways. It is subject to frequent flooding for brief periods in spring. Areas are irregular in shape and range from 7 to 600 acres in size.

Typically, the surface layer is very dark gray clay loam about 7 inches thick. The subsurface layer is very dark gray clay loam about 12 inches thick. The subsoil is olive gray, friable silty clay loam about 21 inches thick. The substratum, to a depth of about 60 inches, is mottled, olive gray and yellowish brown loam. The soil is calcareous throughout. In places, the surface layer is not calcareous.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue soils. These soils are at slightly higher elevations on the landscape and make up 2 to 10 percent of the unit.

This Canisteo soil has moderate permeability. Surface runoff is slow to very slow or the soil is ponded, and available water capacity is high. Most areas of this soil are artificially drained by subsurface drainage, and, to a lesser extent, they are drained by surface ditches. Areas that are not drained have a seasonal high water table within 1 foot of the surface during the wet season. The surface layer is 5.5 percent organic matter. The subsoil is mildly alkaline or moderately alkaline. The shrink-swell potential is moderate in the subsoil and substratum. The frost action potential is high.

This soil is used mainly for corn, soybeans, and some vegetable crops. If the soil is used for cultivated crops, it needs protection from flooding. The seasonal high water table is a limitation. Maintaining artificial drainage minimizes crop damage. Subsurface drainage works well if suitable outlets are available. The high lime content of the soil causes a decrease in phosphorus available for crops. These hazards can be minimized by side dressing the crops with phosphorus and planting crops that are tolerant to a high lime content and wetness.

This soil is generally not suited to dwellings and septic tank absorption fields because of the seasonal high water table and the hazard of flooding.

This soil is in capability subclass IIIw.

361B—Kidder loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops of upland divides. Areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is dark brown loam about 5 inches thick. The subsurface layer is dark brown loam about 3 inches thick. The subsoil is clay loam about 31 inches thick. The upper part is dark brown and friable, the middle part is dark yellowish brown and friable, and the lower part is dark yellowish brown and yellowish brown and firm. The substratum, to a depth of 60 inches, is mildly alkaline sandy loam till. In places, the subsoil is thicker and deeper to calcareous material than is typical. In places, the subsoil is redder than typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Whalan soils that are adjacent to Kidder soils. In Whalan soils, limestone bedrock is at a depth of 2 to 3 feet. These soils make up 5 to 10 percent of the unit.

The Kidder soil has moderate permeability in the subsoil and moderately rapid permeabilty in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 1.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to mildly alkaline. The frost action and shrink-swell potential are moderate in the subsoil. Root development is restricted below a depth of about 36 inches by sandy loam glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is suited to dwellings and septic tank absorption fields, but foundations need to be designed to overcome the shrinking and swelling of the soil. Damage from soil strength and frost action to streets and roads can be reduced by replacing the base material.

This soil is in capability subclass IIe.

361C2—Kidder loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on narrow, convex ridgetops and upper parts of side slopes. Areas are irregular in shape and range from 3 to 80 acres in size.

Typically, the surface layer is dark brown loam about 5 inches thick. The subsoil is about 31 inches thick. The upper part is dark brown, friable clay loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is dark yellowish brown, firm clay loam and gravelly clay loam. The substratum, to a depth of 60 inches, is moderately alkaline sandy loam. In places, the substratum is loam. In some places, there is a subsurface layer, and the subsoil is thicker and deeper to calcareous material. In some areas, the subsoil is redder than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Whalan soils that have loamy material over limestone bedrock. These soils are in similar positions on the landscape as the Kidder soil and make up 10 to 15 percent of the unit.

The Kidder soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 1 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to mildly alkaline. The potential for frost action and shrinking and swelling in the subsoil is moderate. Root development is restricted below a depth of about 36 inches by compact, sandy loam glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too dry, however, causes plants to die. Rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings and is well suited to septic tank absorption fields, but foundations should be designed to overcome the shrinking and swelling of the soil. Frost action and soil strength limit the construction of local streets and roads, but these limitations can be overcome by replacing the base material.

This soil is in capability subclass IIIe.

361D2—Kidder loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on narrow, convex ridgetops and short side slopes. Areas are irregular in shape and range from 3 to 55 acres in size.

Typically, the surface layer is dark brown loam about 4 inches thick. The subsoil is about 27 inches thick. The upper part is dark brown friable loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is dark yellowish brown, firm clay loam. The substratum, to a depth of 60 inches, is mildly alkaline sandy loam. In places, the substratum is loam. In places, there is a subsurface layer, and the subsoil is thicker and deeper to calcareous material. In some areas, the subsoil is redder than is typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Whalan soils. These soils are about 2 or 3 feet of loamy material over limestone bedrock. They are in similar positions on the landscape as the Kidder soil and make up to 10 to 15 percent of the unit.

This Kidder soil has moderate permeability in the subsoil and moderately rapid permeability in the substratum. Surface runoff from cultivated areas is rapid, and available water capacity is moderate. The surface layer is about 1 percent organic matter. It is difficult to till. It crusts after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to mildly alkaline. The potential for frost action and shrinking and swelling in the subsoil is moderate. Root development is restricted below a depth of about 36 inches by compact, sandy loam glacial till.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops,

further erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is moderately suited to dwellings and septic tank absorption fields, but foundations need to be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action, but these limitations can be corrected by strengthening or replacing the base material. Slopes require alteration in places. Slope is a limitation for septic tank absorption fields but can be overcome by placing the filter lines on the contour.

This soil is in capability subclass IIIe.

363B—Griswold loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops of upland divides. Areas are irregular in shape and range from 3 to 25 acres.

Typically, the surface layer is very dark brown loam about 8 inches thick. The subsurface layer is very dark grayish brown loam about 6 inches thick. The subsoil is about 20 inches thick. The upper part is dark brown, friable clay loam; the middle part is yellowish brown, friable sandy clay loam; and the lower part is light yellowish brown, friable sandy loam. The substratum, to a depth of 60 inches, is brownish yellow, yellowish brown, and light yellowish brown, calcareous sandy loam and gravelly sandy loam. In some areas, the subsoil is reddish brown clay loam. In places, the subsoil is thicker and deeper to calcareous material than is typical. Also, in some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue soils in drainageways. These soils make up 2 to 10 percent of the unit.

This Griswold soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 2.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to medium acid. Root development is restricted below a depth of about 36 inches by sandy loam glacial till. The frost action potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is well suited to dwellings and septic tank absorption fields.

This soil is in capability subclass IIe.

363C2—Griswold loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on narrow, convex ridgetops and upper side slopes. Areas are irregular in shape and range from 5 to 75 acres in size.

Typically, the surface layer is very dark brown loam about 7 inches thick. The subsurface layer is very dark grayish brown loam about 4 inches thick. The subsoil is about 18 inches thick. The upper part is dark brown, friable clay loam; the middle part is yellowish brown, friable sandy clay loam; and the lower part is yellowish brown, friable sandy loam. The substratum, to a depth of 60 inches, is yellowish brown, calcareous sandy loam. In some places, the subsoil is thinner and shallower to calcareous material than is typical. In places, the upper part of the subsoil has been mixed with the surface soil by plowing. In some places, this soil is moderately well drained.

Included with this soil in mapping are small areas of Rockton soils. In these loamy soils, limestone bedrock is at a depth of about 2 to 3 feet. They make up 2 to 10 percent of the unit.

This Griswold soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 3 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is mildly alkaline to medium acid. Root development is restricted below a depth of about 36 inches by sandy loam glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too dry, however, causes plants to die. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is well suited to dwellings and septic tank absorption fields.

This soil is in capability subclass IIIe.

386A—Downs silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on ridges and broad divides of uplands. Areas are irregular in shape and range from 4 to 150 acres in size.

Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsoil is about 53 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is yellowish brown, friable silty clay loam; and the lower part is yellowish brown silt loam. In places, the surface is thicker than is typical. In some areas, outwash or a clay loam buried soil is within a depth of 60 inches. In some places, the soil is moderately well drained.

Included with this soil in mapping are areas of somewhat poorly drained Atterberry and Muscatine soils. These soils are in similar positions on the landscape and they make up 2 to 10 percent of the unit.

This Downs soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is very high. The surface layer is about 3 percent organic matter. The subsoil is strongly acid or medium acid. The shrink-swell potential is moderate in the subsoil. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, grass legumes, and pasture. Minimum tillage and cover crops help prevent soil loss from soil blowing. Minimum tillage also reduces soil compaction and formation of tillage pans and improves soil aeration, permeability, and tilth.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome the shrinking and swelling. The soil is well suited to septic tank absorption fields.

This soil is in capability class I.

386B—Downs silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on divides and side slopes on uplands. Areas are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsoil is 53 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is yellowish brown and brown, friable silty clay loam; and the lower part is yellowish brown silt loam. In places, the surface is thicker than is typical, and in other areas, it is thinner than is typical. Outwash and clay loam, buried, older soils are within a depth of 60 inches in some areas. In places, this soil is moderately well drained.

Included with this soil in mapping are areas of somewhat poorly drained Atterberry and Muscatine soils. These soils are on nearly level flats, and they make up 2 to 5 percent of the unit.

This Downs soil has moderate permeability. Surface runoff is medium, and available water capacity is very high. The surface layer is about 3 percent organic matter. The subsoil is strongly acid or medium acid. The shrink-swell potential is moderate in the subsoil. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, grass, legumes, and pasture. Erosion is a hazard if the soil is used for cultivated crops. Minimum tillage keeps soil losses to a minimum; reduces soil compaction and formation of a tillage pan; improves soil aeration, permeability, and tilth; and conserves moisture. Terraces, contour farming, and grass waterways also can be used to reduce soil losses.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome the shrinking and swelling of the soil. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIe.

387A—Ockley silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad terraces of major river valleys. Areas are long and range from 2 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 48 inches thick. The upper part is dark yellowish brown silty clay loam; the middle part is yellowish brown silty clay loam and clay loam; and the lower layer is dark brown gravelly sandy loam and gravelly clay loam. The substratum, to a depth of 60 inches, is yellow, mildly alkaline sand and gravel. In places, this soil is deeper to gravel than is typical.

Included with this soil in mapping are small areas of well drained Fox and Lamont soils. Fox soils are in similar positions as Ockley soils, but gravel is at a shallower depth. Lamont soils have a sandy loam solum. Both of these soils are slightly more droughty than Ockley soils. They make up 10 to 15 percent of the unit.

This Ockley soil has moderate permeability in the subsoil and very rapid permeability in the substratum. Surface runoff from cultivated areas is slow, and available water capacity is moderate. The surface layer is about 1 percent organic matter. It crusts or puddles after hard rain. The subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and legume hay and pasture. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration. Minimum tillage that leaves residue on the surface effectively reduces soil blowing and soil compaction.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome the shrinking and swelling of the soil. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields. Ground water pollution is a hazard, however, as a result of the rapid permeability of the underlying material.

This soil is in capability class I.

387B—Ockley silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on broad, high terraces of major river valleys. Areas are linear in shape and range from 2 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is about 46 inches thick. The upper part is dark yellowish brown silty clay loam; the middle part is dark brown clay loam, and the lower layer is dark brown gravelly clay loam. The substratum, to a depth of 60 inches, is yellowish brown sand and gravel. In places, this soil is deeper to gravel than is typical.

Included with this soil in mapping are small areas of well drained Fox and Lamont soils. Fox soils are in similar areas as Ockley soils, but gravel is at a shallower depth. Lamont soils have a sandy loam solum. Both these soils are slightly more droughty than Ockley soils. They make up 10 to 15 percent of the unit.

This Ockley soil has moderate permeability in the subsoil and very rapid permeability in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 1 percent organic matter. It crusts or puddles after hard rain. The subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and legume hay and pasture. If used for cultivated crops, soil erosion is a hazard. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration. Contour farming and minimum tillage systems that leave residue on the surface effectively prevent excessive soil loss.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome the shrinking and swelling. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields. Ground water pollution is a hazard, however, as a result of the rapid permeability of the underlying material.

This soil is in capability subclass IIe.

397B—Boone sand, 2 to 7 percent slopes. This gently sloping, excessively drained soil is on ridgetops and short side slopes. Areas are irregular in shape and range from 2 to 25 acres in size.

Typically, the surface layer is very dark grayish brown and dark brown sand about 3 inches thick. The substratum, to a depth of 34 inches, is light yellowish brown sand over weathered sandstone. In places where the slope is more gentle, the surface layer and subsurface layer are thicker than is typical. Also, the slope is more than 7 percent in some areas.

Included with this soil in mapping are small areas of Chelsea and Martinsville soils. In Chelsea soils, sandy material extends to a depth of 60 inches. In Martinsville soils, loamy material extends to a depth of 60 inches. These soils are in similar positions on the landscape, and they make up 10 to 15 percent of the unit.

This Boone soil has rapid permeability. Surface runoff from cultivated areas is medium, and available water capacity is very low. The surface layer is about 0.5 percent organic matter. The subsoil is strongly acid. Root development is restricted below a depth of about 34 inches by sandstone bedrock.

This soil is moderately suited to woodland. Many areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees. Seedling mortality can be severe. These soils are droughty. Soil blowing can be reduced when establishing new stands by such management as returning residue to the soil.

This soil is suited to dwellings without basements. Adequate vegetative cover is difficult to maintain around homesites as a result of droughtiness. The soil is poorly suited to septic tank absorption fields. Effluent from septic tank absorption fields can contaminate ground water supplies because of seepage into the sandstone bedrock.

This soil is in capability subclass IVs.

397D—Boone sand, 7 to 15 percent slopes. This strongly sloping, excessively drained soil is on ridgetops and short side slopes. Areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is very dark grayish brown and dark brown sand about 2 inches thick. The substratum, to a depth of 34 inches, is yellowish brown and light yellowish brown sand over weathered sandstone. In places, the surface layer and subsurface layer are thicker than is typical. Also, in some areas, slope is more than 15 percent.

Included with this soil in mapping are small areas of Chelsea soils. In Chelsea soils, sandy material extends to a depth of 60 inches and the surface layer is light colored. These soils make up about 5 to 15 percent of the unit.

This Boone soil has rapid permability. Surface runoff from cultivated areas is rapid, and available water capacity is very low. The surface layer is about 0.5 percent organic matter. The subsoil is strongly acid. Root development is restricted below a depth of about 34 inches by sandstone bedrock.

This soil is moderately suited to woodland, and many areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees. Seedling mortality can be severe. These soils are droughty. Soil blowing can be reduced when establishing new stands by using such

management practices as returning crop residue to the soil.

This soil is only moderately suited to dwellings without basements. The slope is a limitation, and the depth to bedrock makes alteration difficult. Adequate vegetative cover is difficult to maintain on this soil. The soil is poorly suited to septic tank absorption fields. Effluent from septic tank absorption fields can contaminate ground water supplies because of seepage into the sandstone bedrock. Slope is also a limitation.

This soil is in capability subclass VIs.

397F—Boone sand, 15 to 45 percent slopes. This moderately steep to very steep, excessively drained soil is on ridgetops and short side slopes. Areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark brown sand about 2 inches thick. The substratum, to a depth of 34 inches, is light yellowish brown sand over weathered sandstone. In places, the surface layer and subsurface layer are thicker or may be absent. Also, in some areas, slope is less than 15 percent.

Included with this soil in mapping are small areas of Chelsea, Martinsville, and Whalan soils. Whalan soils are loamy to a depth of about 30 inches to limestone bedrock. In Chelsea soils, sandy material extends to a depth of 60 inches and the surface layer is light colored. In Martinsville soils, loamy material extends to a depth of 60 inches. These soils make up about 10 to 15 percent of the unit.

This Boone soil has rapid permeability. Surface runoff is rapid, and available water capacity is very low. The surface layer is about 0.5 organic matter. The subsoil is strongly acid. Root development is restricted below a depth of about 34 inches by sandstone bedrock.

This soil is only moderately suited to woodland, and most areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. The limitations to planting or harvesting trees are moderate. Seedling mortality can be severe. This soil is droughty.

This soil is generally not suited to dwellings and septic tank absorption fields.

This soil is in capability subclass VIIs.

398A—Wea silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on broad, high terraces of major river valleys. Areas are long and range from 2 to 200 acres in size.

Typically, the surface layer is very dark brown silt loam about 8 inches thick. The subsurface layer is very dark brown silt loam about 5 inches thick. The subsoil is about 46 inches thick. The upper part is dark brown silt loam, the middle part is dark yellowish brown clay loam, and the lower part is dark brown gravelly loamy sand. The substratum, to a depth of 60 inches, is brown and strong brown moderately alkaline sand and gravel. In places, the depth to gravel is more than 60 inches. In a few small areas, the surface layer is light colored.

This Wea soil has moderate permeability in the subsoil and very rapid permeability in the substratum. Surface runoff is slow from cultivated areas, and available water capacity is moderate. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is slightly acid. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Returning crop residue to the soil or regular additions of other organic material maintains fertility and reduces crusting. Soil blowing can be controlled by using minimum tillage that leaves residue on the surface or that partly incorporates the residue into the soil.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. Onsite septic tank absorption fields work well, but ground water pollution is a hazard as a result of the rapid permeability of the underlying material. The soil is a good source of sand and gravel.

This soil is in capability class I.

398B—Wea silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on broad, high terraces of major river valleys. Areas are linear in shape and range from 2 to 100 acres in size.

Typically, the surface layer is very dark gray silt loam about 6 inches thick. The subsurface layer is very dark brown silt loam about 5 inches thick. The subsoil is about 46 inches thick. The upper part is dark brown silt loam, the middle part is dark yellowish brown clay loam, and the lower part is dark brown gravelly loamy sand. The substratum, to a depth of 60 inches, is brown and strong brown, moderately alkaline sand and gravel. In places, depth to gravel is more than 60 inches. In a few small areas, the surface layer is light colored and has less organic matter than typical.

This Wea soil has moderate permeability in the subsoil and very rapid permeability in the substratum. Surface runoff is medium from cultivated areas, and available water capacity is moderate. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is slightly acid.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If this soil is used for cultivated crops, damage by water erosion is a hazard. Using minimum tillage that leaves residue on the surface protects the surface from water erosion.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base

material. Onsite septic tank absorption fields work well, but ground water pollution is a hazard as a result of rapidly permeable gravel.

This soil is in capability subclass IIe.

410B—Woodbine silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex upper side slopes and ridgetops of uplands. Areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 44 inches thick. The upper part is yellowish brown silty clay loam, the middle part is yellowish brown and dark brown clay loam, and the lower part is yellowish red silty clay and strong brown clay. Fractured, dolomitic limestone bedrock extends through a depth of 60 inches. In places, the surface layer is thinner than is typical.

Included with this soil in mapping are small areas of well drained Flagg soils. These soils are in positions similar to those of Woodbine soils, but they do not have bedrock within 60 inches of the surface. Flagg soils make up 2 to 5 percent of the unit.

This Woodbine soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part of the subsoil. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain. The subsoil is strongly acid to slightly acid. The shrink-swell potential is moderate in the upper and middle parts of the subsoil and high in the lower part.

This soil is well suited to cultivated crops, hay, and pasture. If used for cultivated crops, damage by water erosion is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular addition of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is only moderately suited to dwellings. The shrink-swell potential is a limitation, especially for dwellings with basements, but foundations can be designed to overcome this problem. If basements are installed, excavation of the rippable bedrock is necessary in places. The soil strength and shrink-swell limitations for streets and roads can be reduced by replacing the base material. The soil is very poorly suited to septic tank absorption fields because of the slow permeability in the lower part and depth to bedrock.

This soil is in capability subclass IIe.

410C2—Woodbine silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex side slopes on uplands. Areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is brown mixed with some yellowish brown silt loam about 5 inches thick. The subsoil is about 42 inches thick. The upper part is yellowish brown silty clay loam, the middle part is yellowish brown and dark brown clay loam, and the lower part is yellowish red silty clay and strong brown clay. Fractured dolomitic limestone bedrock underlies the subsoil to a depth of 60 inches. In places, the surface layer is thinner and is silty clay loam or clay loam.

Included with this soil in mapping are small areas of Flagg soils. These soils are in similar positions as Woodbine soils, but they do not have bedrock within 60 inches of the surface. Flagg soils make up 2 to 5 percent of the unit.

This Woodbine soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part of the subsoil. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 1.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain. The subsoil is strongly acid to slightly acid. The shrink-swell potential is moderate in the upper and middle parts of the subsoil and high in the lower part.

This soil is suited to cultivated crops, hay, and pasture. If used for cultivated crops, water erosion is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture and hay effectively controls erosion. Overgrazing, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, weed control, and timely deferment of grazing help keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings. The shrink-swell potential is a limitation, especially for dwellings with basements, but foundations can be designed to overcome this problem. If basements are installed, excavation of the rippable bedrock is necessary in places. The soil strength and shrink-swell limitations for streets and roads can be reduced by replacing the base material. The soil is very poorly suited to septic tank absorption fields because of the slow permeability in the lower part and depth to bedrock.

This soil is in capability subclass IIe.

411B—Ashdale silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls. Areas are irregular in shape and range from 4 to 370 acres in size.

Typically, the surface layer is very dark brown silt loam about 10 inches thick. The subsurface layer is dark brown and very dark grayish brown silt loam about 7 inches thick. The subsoil is about 33 inches thick. The upper part is dark brown, friable silty clay loam; the middle part is dark yellowish brown, friable silty clay loam; and the lower part is brown and dark brown, firm clay. The substratum is yellow and brownish yellow dolomitic limestone. In places, the bedrock is closer to the surface than is typical. Also, in some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained and moderately well drained Catlin, Ogle, Plano, and Tama soils. Tama soils have more than 5 feet of loess. In Ogle soils, a reddish paleosol layer is at a depth of about 3 feet. In Catlin soils, calcareous loam till is at a depth of about 4 feet. Plano soils are underlain by outwash at a depth of about 4 feet. These soils are in similar positions on the landscape as Ashdale soils, and they make up 5 to 12 percent of the unit.

This Ashdale soil has moderate permeability in the upper part of the subsoil and moderately slow or slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 4 percent organic matter. The subsoil is medium acid to strongly acid. The shrink-swell potential is moderate in the upper and middle parts of the subsoil and high in the lower part. The frost action potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Erosion is a hazard when it is used for cultivated crops. Contour farming, cover crops, and minimum tillage help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is only moderately suited to poorly suited to dwellings because of the shrink-swell potential, but foundations can be designed to overcome this limitation. The soil lacks sufficient strength and stability to support vehicular traffic and it is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is very poorly suited to septic tank absorption fields because of the moderately slow permeability or slow permeability in the lower part and depth to bedrock. The underlying bedrock is a source of agricultural lime and crushed rock.

This soil is in capability subclass IIe.

411C2—Ashdale silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and uneven side slopes. Areas are long or irregular in shape and range from 4 to 60 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 32 inches thick. The upper part is dark yellowish brown, friable silty clay loam; and the lower part is strong brown and dark brown, firm clay. The substratum is brownish yellow dolomitic limestone. In many areas, the lighter colored subsoil has been mixed with the surface layer. In places, the soil is shallower to bedrock than is typical. Also, in some places, the soil is moderately well drained.

Included with this soil in mapping and making up 5 to 15 percent of the unit are small areas of well drained Ogle, Plano, and Tama soils. Tama soils have more than 5 feet of loess. In Ogle soils, a reddish paleosol layer is at a depth of about 3 feet. Plano soils are underlain by outwash at a depth of about 4 feet. These soils are in similar positions on the landscape as Ashdale soils.

This Ashdale soil has moderate permeability in the upper part of the subsoil and moderately slow permeability or slow permeability in the lower part. The surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid to strongly acid. The shrink-swell potential is moderate in the upper part of the subsoil and high in the lower part. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. When the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to poorly suited to dwellings because of the shrink-swell potential. Foundations can be designed to overcome this limitation. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is very poorly suited to septic tank absorption fields because of the moderately slow permeability or slow permeability and depth to bedrock. The underlying bedrock is a source of agricultural lime and crushed rock.

This soil is in capability subclass IIe.

412B—Ogle silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and broad, even side slopes. Areas are irregular in shape and range from 5 to 400 acres in size.

Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsurface layer is very dark grayish brown and dark brown silt loam about 4 inches thick. The subsoil extends to a depth of 65 inches. The upper part is dark brown and dark yellowish brown, friable silty clay loam; the middle part is yellowish brown, friable silty clay loam and silt loam; and the lower part is reddish brown and yellowish red, friable loam and firm clay loam. In places, the subsoil is thinner and shallower to a clay substratum than is typical. Also, in some places the soil is moderately well drained.

Included with this unit in mapping are small areas of well drained Ashdale soils. These soils have silty material to a depth of about 50 inches over limestone bedrock. They make up 2 to 10 percent of the unit.

This Ogle soil has moderate permeability. Surface runoff from cultivated areas is medium, and available

water capacity is high. The surface layer is about 4 percent organic matter. It crusts or puddles after hard rain, especially in the areas where the plow layer contains subsoil material. The subsoil is neutral. Root development is restricted below a depth of about 50 inches by compact, reddish glacial till. The shrink-swell potential is moderate in the subsoil. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or the regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIe.

412C2—Ogle silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops, knolls, and uneven side slopes. Areas are irregular in shape and range from 2 to 15 acres in size.

Typically, the surface layer is very dark gray silt loam about 7 inches thick. The subsoil extends to a depth of more than 60 inches. The upper part is dark brown and dark yellowish brown, friable silty clay loam; the middle part is yellowish brown, friable silty clay loam and silt loam; and the lower part is reddish brown and yellowish red, friable and firm clay loam. In places, the subsoil is thinner and shallower to a clay substratum than is typical. In areas where the upper part of the subsoil has been mixed with the former surface layer by plowing, the present surface layer is dark brown silt loam. Also, in some places the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Ashdale soils. These soils have silty material to a depth of about 50 inches over limestone bedrock. They make up 5 to 12 percent of the unit.

This Ogle soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 3.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral. Root development is restricted below a depth of about 50 inches by compact, reddish glacial till. The shrink-swell potential is moderate in the subsoil. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIe.

414B—Myrtle silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex side slopes. Areas are irregular in shape and range from 2 acres to several hundred acres in size.

Typically, the surface layer is very dark grayish brown and yellowish brown silt loam about 7 inches thick. The subsoil extends to a depth of 60 inches. The upper part is dark brown and yellowish brown, friable silty clay loam; the middle part is dark yellowish brown and yellowish brown loam; and the lower part is yellowish red sandy clay loam. In places, the silty part of the subsoil is thicker than is typical. In a few places, the substratum is yellowish brown sandy loam, loamy sand, or sand. Also, in some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Elburn soils. These soils are in shallow depressions and drainageways, and they make up 2 to 5 percent of the unit.

This Myrtle soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2.5 percent organic matter. It is neutral. The subsoil is very strongly acid to slightly acid. The shrink-swell potential is moderate in the subsoil. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic matter maintains fertility, reduces crusting, and increases water infiltration.

This soil is well suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are no hazards to planting or harvesting trees.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is only moderately suited to septic tank absorption fields because of the permeability. Increasing the size of the absorption field helps overcome this limitation.

This soil is in capability subclass IIe.

415—Orion silt loam. This nearly level, somewhat poorly drained soil is on flood plains along small streams or foot slopes adjacent to stream terraces. It is subject to frequent flooding of brief duration from March to November. Areas are irregular in shape and range from 2 acres to several hundred acres in size.

Typically, the surface layer is dark grayish brown and very dark grayish brown silt loam, to a depth of 7 inches. The substratum, to a depth of 27 inches, is dark grayish brown and grayish brown, friable silt loam. Next is a buried soil, to a depth of 47 inches, that is very dark gray and very dark grayish brown silt loam. Below this is dark grayish brown, friable silty clay loam and grayish brown friable silt loam to a depth of 69 inches. In places, the substratum is black, organic muck. In a few areas, there is a buried surface layer of dark grayish brown silt loam. In some places, the soil formed in loamy sediment.

Included with this soil in mapping are small areas of poorly drained Comfrey and Sawmill soils. Comfrey and Sawmill soils are in shallow depressions and drainageways, and they make up 2 to 10 percent of the unit.

This Orion soil has moderate permeability. Surface runoff from cultivated areas is slow and available water capacity is very high. A seasonal high water table is at a depth of 1 foot to 3 feet. The soil is moderately alkaline throughout. The surface layer is about 2 percent organic matter. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Returning crop residue to the soil or regular additions of other organic material helps improve fertility, reduce crusting, and increase water infiltration.

This soil is suited to pasture or hay. Overgrazing or grazing when the soil is too wet, however, causes surface compaction and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods help keep the pasture and soil in good condition.

This soil is suited to openland and wetland wildlife habitat. The supply of many habitat elements is adequate for mammals and birds of openland and wetland areas.

This soil is in capability subclass IIw.

416B—Durand silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and side slopes. Areas are irregular in shape and range from 5 to 20 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is about 47 inches thick. The upper part is dark brown silty clay loam and clay loam, the middle part is reddish brown loam, and the lower part is yellowish red loam. In places, the subsoil is thinner and shallower to calcareous material than is typical.

Included with this soil in mapping are small areas of Ogle soils. These soils are 3 to 4 feet of silty material over a reddish loam paleosol. They make up 5 to 12 percent of the unit.

This Durand soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 4 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid or medium acid. Root development is restricted below a depth of about 24 inches by compact, reddish, loamy glacial till. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIe.

416C2—Durand silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex slopes and ridgetops. Areas are irregular in shape and range from 2 to 25 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsoil is about 53 inches thick. The upper part is dark brown silty clay loam and clay loam, the middle part is reddish brown loam, and the lower part is yellowish red loam. In places, the subsoil is thinner and shallower to calcareous material than is typical.

Included with this soil in mapping are small areas of Ogle soils. These soils are 3 to 4 feet of silty material over a reddish loam paleosol. They make up 5 to 12 percent of the unit.

This Durand soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is 3 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid or

medium acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 24 inches by compact, reddish, loamy glacial till.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. When the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction. Timely deferment of grazing and restricted use during wet periods help keep the pasture and soil in good condition.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIIe.

419B—Flagg silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and side slopes on uplands. Areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches. The upper part is yellowish brown, friable silty clay loam; the middle part is dark yellowish brown friable and firm silty clay loam; and the lower part is yellowish brown and yellowish red, friable sandy clay loam. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Palsgrove soils. These soils are adjacent to Flagg soils and are on similar landscapes. They are silty material to a depth of about 50 inches over limestone bedrock, and they make up 5 to 12 percent of the unit.

This Flagg soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 50 inches by compact, reddish glacial till. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is suited to dwellings and septic tank absorption fields. The shrink-swell potential is a limitation to dwellings, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The moderate permeability is a limitation for septic tank absorption fields; increasing the size of the absorption field can correct this problem.

This soil is in capability subclass IIe.

419C2—Flagg silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex, upland side slopes. Areas are irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsurface layer is mixed into the surface layer by plowing. The subsoil extends to a depth of 60 inches. The upper part is yellowish brown, friable silty clay loam; the middle part is dark yellowish brown, friable and firm silty clay loam; and the lower part is yellowish brown and yellowish red, friable sandy clay loam. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Palsgrove soils. These soils are silty material to a depth of about 50 inches over limestone bedrock. They make up 5 to 12 percent of the unit.

This Flagg soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 50 inches by compact, reddish glacial till. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and

seedlings survive and grow well with such good timber management as site preparation, or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings and septic tank absorption fields. The shrink-swell potential is a limitation for dwellings, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The moderate permeability is a limitation for septic tank absorption fields; increasing the size of the absorption field can overcome this problem.

This soil is in capability subclass IIe.

429B—Palsgrove silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls. Areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is dark grayish brown and dark brown silt loam about 10 inches thick. The subsoil is about 49 inches thick. The upper part is dark yellowish brown, friable silty clay loam; the middle part is dark yellowish brown and yellowish brown, friable silty clay loam; and the lower part is reddish brown, yellowish red, and yellowish brown clay. The substratum is limestone bedrock.

Included with this soil in mapping are small areas of well drained Fayette and Flagg soils. In Fayette soils, silty material extends to a depth of 60 inches or more. In Flagg soils, about 4 feet of silty material is over reddish clay loam. These soils lie adjacent to Palsgrove soils and make up 5 to 12 percent of the unit.

This Palsgrove soil has moderate permeability in the upper part of the subsoil and very slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to strongly acid. The shrink-swell potential is moderate in the upper and middle parts of the subsoil and high in the lower part. Root development is restricted below a depth of about 50 inches by limestone bedrock. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is only moderately suited to poorly suited to dwellings because of the shrink-swell potential, but foundations can be designed to overcome this limitation. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is very poorly suited to septic tank absorption fields because of the very slow permeability in the lower part and depth to bedrock. The underlying bedrock is a source of agricultural lime and crushed rock.

This soil is in capability subclass IIe.

429C2—Palsgrove silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and uneven side slopes. Areas are elongated or irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer is very dark brown silt loam about 7 inches thick. The subsoil is about 45 inches thick. The upper part is dark yellowish brown, friable silty clay loam; the middle part is yellowish brown and dark yellowish brown silty clay loam; and the lower part is reddish brown and yellowish brown clay. The substratum is limestone bedrock. In some areas where the upper part of the subsoil has been mixed with the former surface layer, the present surface soil is dark yellowish brown silty clay loam. In some places, fractured dolomitic bedrock is within a depth of 20 to 40 inches.

Included with this soil in mapping are small areas of well drained Fayette and Flagg soils. In Fayette soils, the silty material extends to a depth of 60 inches. In Flagg soils, about 4 feet of silty material is over reddish clay loam. These soils lie adjacent to Palsgrove soils and make up 5 to 12 percent of the map unit.

This Palsgrove soil has moderate permeability in the upper part of the subsoil and very slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral to strongly acid. The shrink-swell potential is moderate in the upper and middle parts of the subsoil and high in the lower part. The root development is restricted below a depth of about 50 inches by limestone bedrock. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum

tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation, or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to poorly suited to dwellings because of the shrink-swell potential, but foundations can be designed to overcome this limitation. The soil lacks sufficient strength and stability to support vehicular traffic and is limited by frost action. These limitations can be corrected by strengthening or replacing the base material. The soil is very poorly suited to septic tank absorption fields because of the very slow permeability in the lower part and depth to bedrock. The underlying bedrock is a source of agricultural lime and crushed rock.

This soil is in capability subclass IIe.

440A—Jasper loam, 0 to 2 percent slopes. This nearly level, well drained soil is on uplands and slightly elevated areas of terraces along streams. Areas are irregular in shape and range from 2 to 200 acres in size.

Typically, the surface layer is very dark gray loam about 11 inches thick. The subsurface layer is very dark gray loam about 5 inches thick. The subsoil is aout 36 inches thick. The upper part is brown, friable silt loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is dark yellowish brown, friable sandy loam and loamy sand. The substratum, to a depth of 60 inches, is yellowish brown and brown silt loam. In places, the surface layer is thinner. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of the somewhat poorly drained La Hogue soil. It is at slightly lower positions on the landscape than Jasper soil and makes up 5 to 15 percent of the unit.

This Jasper soil has moderate permeability. Surface runoff is slow, and available water capacity is high. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is medium acid or strongly acid. The shrink-swell potential is low in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration. Minimum tillage is effective in maintaining favorable soil tilth.

This soil is suited to dwellings. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. It is suited to septic tank absorption fields. Permeability can be a limitation; but it can be overcome by increasing the size of the absorption field.

This soil is in capability class I.

440B—Jasper loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on uplands and slightly elevated areas of terraces along streams. Areas are irregular in shape and range from 2 to 150 acres in size.

Typically, the surface layer is very dark gray loam about 9 inches thick. The subsurface layer is very dark gray loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is brown, friable silt loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is dark yellowish brown, friable sandy loam and loamy sand. The substratum, to a depth of 60 inches, is yellowish brown and brown silt loam. In places, the surface layer is thinner. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of the somewhat poorly drained La Hogue soil. This soil is at slightly lower positions on the landscape than Jasper soils and makes up 2 to 5 percent of the unit.

This Jasper soil has moderate permeability. Surface runoff is medium, and available water capacity is high. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is medium acid or strongly acid.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Damage by water erosion is a hazard if the soil is used for cultivated crops. Minimum tillage effectively prevents excessive soil loss, compaction, and damage to soil structure. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is suited to septic tank absorption fields. Permeability is a limitation that can be overcome by increasing the size of the absorption field.

This soil is in capability subclass IIe.

440C2—Jasper loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on uplands and terrace breaks. Areas are irregular or linear in shape and range from 2 to 50 acres in size.

Typically, the surface layer is very dark brown loam about 7 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown, friable clay loam; and the lower part is dark yellowish brown, friable loamy sand and yellowish brown and yellowish red, fri-

able sandy loam. The substratum, to a depth of 60 inches, is yellowish brown silt loam. In places, the surface layer is thinner than typical. In some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of Atkinson and Parr soils. These soils are on slightly steeper parts of side slopes and make up 2 to 5 percent of the unit.

This Jasper soil has moderate permeability. Surface runoff is medium, and available water capacity is high. The surface layer is about 2.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid or strongly acid. The shrink-swell potential is low in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Damage by water erosion is a hazard if the soil is used for cultivated crops. Minimum tillage effectively prevents excessive soil loss, compaction, and damage to soil structure. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture and hay effectively controls erosion. Overgrazing, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and weed control keep the pasture and soil in good condition.

This soil is suited to dwellings. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is suited to septic tank absorption fields. Moderate permeability is a limitation that can be overcome by increasing the size of the absorption field.

This soil is in capability subclass IIIe.

451—Lawson silt loam. This nearly level, somewhat poorly drained soil is on flood plains along small streams or on foot slopes adjacent to stream terraces. It is subject to occasional flooding of brief duration from March to November. Areas are irregular in shape and range from 2 acres to several hundred 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 black silt loam about 51 inches thick. The substratum is very dark gray silty clay loam to a depth of about 75 inches. In places, the substratum is black, organic muck. In a few areas, there is a buried surface layer of dark grayish brown silt loam. In some places, the soil formed in loamy sediment.

Included with this soil in mapping are small areas of poorly drained Comfrey and Sawmill soils. These soils are in shallow depressions and drainageways, and they make up 2 to 10 percent of the unit.

This Lawson soil has moderate permeability. Surface runoff is slow, and available water capacity is very high. A seasonal high water table is at a depth of 1 foot to 3 feet. The surface layer is about 4 percent organic matter. The subsoil is mildly alkaline. The shrink-swell potential is moderate in the substratum. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, the hazard of flooding and deposition of additional soil can cover plants. Protecting the soil from flooding and artificially draining wet areas by subsurface drainage minimize damage to crops. Soil erosion is a limitation if the soil is disturbed and left bare and exposed for a considerable period of time.

Using this soil for pasture and hay effectively controls damage by flooding. Grazing when the soil is too wet, however, causes very rough surfaces as livestock feet sink through the sod. Proper stocking, pasture rotation, and restricted use during wet periods help keep the pasture and soil in good condition.

This soil is in capability subclass IIw.

490—Odell loam. This nearly level, somewhat poorly drained soil is on upland divides between well drained soils on ridges and knobs. Areas are irregular in shape and range from 5 to 180 acres in size.

Typically, the surface layer is black loam about 8 inches thick. The subsurface layer is black loam about 5 inches thick. The subsoil is about 12 inches thick. The upper part is very dark grayish brown and dark grayish brown clay loam, and the lower part is olive brown clay loam. The substratum, to a depth of about 60 inches, is mottled light olive brown, grayish brown, and olive yellow, calcareous loam. In places, the subsoil is thicker and deeper to calcareous loam than typical. In a few areas, the soil has a dark colored layer less than 10 inches thick. In some places, the subsoil formed in thicker silty material.

Included in the mapping are small areas of well drained Parr soils and poorly drained Selma soils. Parr soils are on rises and mounds upslope from Odell soils. Selma soils are in depressions and low lying upland flats.

This Odell soil has moderately slow permeability. Surface runoff from cultivated areas is slow, and available water capacity is high. A seasonal high water table is at a depth of 1 foot to 3 feet. The surface layer is about 4.5 percent organic matter. It crusts or puddles after hard rain, especially in areas where heavy equipment has been working. The subsoil is neutral to mildly alkaline. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 31 inches by compact, loamy glacial till. The frost heave potential is high.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is poorly suited to dwellings and septic tank absorption fields. The seasonal high water table is a

limitation for dwellings. The permeability and the seasonal high water table are limitations for septic tank absorption fields.

This soil is in capability class I.

503B—Rockton silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridges and broad side slopes. Areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is black, very dark gray, and dark brown silt loam about 15 inches thick. The subsoil is about 7 inches thick. The upper part is brown, friable clay loam; the lower part is dark yellowish brown, firm clay. Weathered dolomite bedrock is at a depth of 29 inches. In places, the subsoil is thicker and deeper to bedrock than is typical. In places, a layer of reddish clay is over the bedrock.

Included with this soil in mapping are small areas of well drained Dickinson and Jasper soils. In Dickinson soils, sandy material extends to a depth of 60 inches. In Jasper soils, loamy outwash material extends to a depth of 60 inches. These soils make up 10 to 25 percent of the unit.

This Rockton soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 4 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid. Root development is restricted below a depth of 29 inches by limestone bedrock. The shrink-swell potential is moderate in the upper part of the soil and high in the lower part.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is poorly suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil is poorly suited to septic tank absorption fields. Effluent from septic tank absorption fields can contaminate ground water supplies as a result of rapid infiltration of limestone bedrock.

This soil is in capability subclass IIe.

503C2—Rockton silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex ridges, knolls, and short side slopes. Areas are irregular in shape and range from 4 to 75 acres in size.

Typically, the surface layer is black silt loam about 7 inches thick. The subsurface layer is black, very dark gray, and dark brown silty clay loam and loam about 10 inches thick. The subsurface layer is mixed with the surface layer by plowing. The subsoil is about 7 inches thick. The upper part is brown, friable clay loam; the lower part is dark yellowish brown, firm clay. The subsoil is underlain by limestone bedrock at a depth of about 24 inches. In places, the subsoil is thicker and deeper to bedrock. Where the upper part of the subsoil has been mixed with the former surface soil by plowing, the present surface layer is dark brown silt loam. In places, the bedrock crops out on the surface.

Included with this soil in mapping are small areas of well drained Jasper soils and soils that have till or outwash over the bedrock. In Jasper soils, loamy outwash material extends to a depth of 60 inches. These soils make up 5 to 12 percent of the map unit.

This Rockton soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 3.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of 24 inches by limestone bedrock.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using the soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is poorly suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil is generally not suited to septic tank absorption fields. Effluent from septic tank absorption fields can contaminate ground water supplies as a result of rapid infiltration of limestone bedrock.

This soil is in capability subclass IIIe.

504D—Sogn loam, 7 to 15 percent slopes. This sloping to strongly sloping, somewhat excessively drained soil is on convex side slopes on uplands. Areas are irregular in shape and range from 2 acres to more than 100 acres in size.

Typically, the surface layer is very dark brown loam about 10 inches thick over yellow limestone bedrock. This bedrock is fractured in the upper part and becomes more consolidated as depth increases. In places, the surface layer is thicker and deeper to bedrock than is typical. In a few areas, the surface layer is black loamy sand or sand. In a few places, the subsoil is brown, firm silty clay loam in the upper part and dark reddish brown,

very firm clay in the lower part. In a few places, the surface layer is dark grayish brown silt loam or dark yellowish brown silty clay loam.

Included with this soil in mapping are areas of well drained Griswold and Winnebago soils. These soils are in similar positions on the landscape as Sogn soils, but they are more than 6 feet thick over bedrock and bedrock crops out at the surface. These soils make up 2 to 5 percent of the unit.

This Sogn soil has moderate permeability. Surface runoff from pastured areas is rapid, and available water capacity is very low. The surface layer is about 3 percent organic matter. The subsoil generally is neutral. Root development is restricted below a depth of about 10 inches by the dolomitic bedrock.

This soil is not suited to cultivated crops or hay because the soil is droughty and rocks on the surface and rock outcrops hinder cultivation.

Most areas of this soil are in pasture. Proper stocking, pasture rotation, and timely deferment of grazing keep the soil in good condition.

This soil is in capability subclass VIIs.

504F—Sogn loam, 15 to 45 percent slopes. This moderately steep to very steep, somewhat excessively drained soil is on bluffs and escarpments facing major river valleys and is in upper reaches of drainageways. Areas are linear in shape and range from 4 to 40 acres.

Typically, the surface layer is very dark brown loam about 7 inches thick over yellow limestone bedrock. It is fractured in the upper part and becomes more consolidated with increasing depth (fig. 9). In places, the surface is a black channery or flaggy loam. In a few places, the surface layer is thicker and deeper to bedrock than is typical, or the surface layer is black loamy sand or sand.

Included with this soil in mapping are areas of bedrock outcrops that make up 10 to 15 percent of the unit.

This Sogn soil has moderate permeability. Surface runoff is rapid to very rapid, and available water capacity is very low. The surface layer is 3 percent organic matter. It is neutral or mildly alkaline. Root development is restricted below a depth of about 7 inches by the dolomitic bedrock.

Most areas of this soil are idle or are wooded. In most places in the county, the soil has never been tilled and only very occasionally grazed by livestock. These natural areas present an aesthetic array of native prairie plants and harbor the only residual white pine stand in the county. The soil is suited to openland or woodland wildlife habitat because it is suited to woody or herbaceous plants. Wildlife habitat developments can include trees, shrubs, grasses, and legumes. The underlying bedrock is a good source of limestone and crushed rock for roads.

This soil is in capability subclass VIIs.

505C2—Dunbarton silty clay loam, 5 to 12 percent slopes, eroded. This sloping, well drained soil is on convex side slopes on uplands. Areas are irregular in shape and range from 3 to 20 acres in size.

Typically, the surface layer is dark grayish brown silty clay loam about 7 inches thick. The subsoil is about 11 inches thick. The upper part is dark brown and dark grayish brown silt loam, the middle part is dark brown silty clay loam, and the lower part is dark yellowish brown clay. The subsoil is over dolomitic bedrock. In a few areas, the surface layer is dark brown silty loam.

Included with this soil in mapping are small areas of well drained Martinsville, Miami, Sogn, and Whalan soils. Martinsville soils have 3 to 4 feet of loamy material over sand and silt. Miami soils have 2 to 3 feet of loamy material over loamy glacial till. Sogn soils have more sand and less silt in the solum. Whalan soils have 2 to 3 feet of loamy material over limestone bedrock. These

Figure 9.—Roadcut exposing the bedrock below Sogn loam, 15 to 45 percent slopes.

soils are on similar landscapes as Dunbarton soils, and they make up 10 to 15 percent of the unit.

This Dunbarton soil has moderately slow permeability. Surface runoff is medium, and available water capacity is low. The surface layer is about 1.5 percent organic matter. It is difficult to till. It is generally neutral, and the subsoil is slightly acid or neutral. The shrink-swell potential is high in the lower part of the subsoil. Root development is restricted below a depth of about 18 inches by dolomitic bedrock.

This soil is suited to small grain and grass and legume hay and pasture. The erosion hazard and low available water capacity are the major concerns of farming. Minimum tillage, contour farming, crop residue management, and cover crops help reduce soil losses and conserve moisture. Proper stocking, uniform grazing distribution, and a planned grazing system keep the pasture and soil in good condition.

This soil is in capability subclass IVe.

505E2—Dunbarton silty clay loam, 12 to 20 percent slopes, eroded. This strongly sloping and moderately steep, well drained soil is on convex side slopes on uplands. Areas are irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is brown and dark yellowish brown silty clay loam about 5 inches thick. The subsoil is about 11 inches thick. The upper part is dark yellowish brown silty clay loam, and the lower part is brown clay. The subsoil is underlain by dolomitic bedrock.

Included with this soil in mapping are small areas of well drained Pecatonica, Sogn, and Whalan soils. Pecatonica soils have about 2 feet of loamy material over reddish clayey material. Sogn soils are shallow to limestone bedrock. Whalan soils have 2 to 3 feet of loamy material over limestone bedrock. These soils are on similar landscapes as Dunbarton soils, and they make up 10 to 25 percent of the unit.

This Dunbarton soil has moderately slow permeability. Surface runoff is rapid, and available water capacity is low. The surface layer is about 1.5 percent organic matter. It generally is neutral, and the subsoil is slightly acid or neutral. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 16 inches by dolomitic bedrock.

This soil is suited to small grain and grass and legume hay and pasture. The erosion hazard and low available water capacity are the major concerns of farming. Proper stocking, uniform grazing distribution, and a planned grazing system help keep the pasture and soil in good condition.

This soil is only moderately suited to openland or woodland wildlife habitat. It is suited to woody or herbaceous plants. Wildlife habitat developments can include trees, shrubs, grasses and legumes. Protection from fire and grazing is essential.

This soil is in capability subclass VIe.

509B—Whalan loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex, upland ridges. Areas are irregular in shape and range from 2 to 100 acres in size.

Typically, the surface layer is dark grayish brown loam about 7 inches thick. The subsurface layer is dark grayish brown loam about 3 inches thick. The subsoil is about 28 inches thick. The upper part is dark brown, friable clay loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is reddish brown, firm clay. The subsoil is over brownish yellow fractured dolomitic bedrock. In places, the subsoil is thicker and bedrock is at a depth of more than 40 inches. In places, the reddish brown clay layer is more than 6 inches thick.

Included with this soil in mapping are well drained Pecatonica and Westville soils. These soils formed in loamy glacial drift, are void of bedrock, and are in similar positions on the landscape as Whalan soils.

This Whalan soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is medium and available water capacity is low. The surface layer is about 2 percent organic matter. The soil is neutral to strongly acid. Root development is restricted below a depth of about 36 inches by fractured, dolomitic bedrock. The shrink-swell potential is high. The frost action potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Major limitations for farming are the hazard of erosion and low available water supply. Minimum tillage, contour farming, and cover crops that maintain adequate vegetative cover and ground mulch helps prevent excessive soil losses and improves the moisture supplying capacity by reducing runoff. Proper stocking, uniform grazing distribution, and a planned grazing system keep the pasture and soil in good condition.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying or girdling. There are few limitations to planting or harvesting trees.

This soil is well suited to dwellings without basements. It is only moderately suited to dwellings with basements. Construction costs increase because bedrock must be excavated. The upper few feet of the surface generally is rippable with medium size construction equipment. These soils are only moderately suited to local roads and streets because of soil strength and frost action limitations. The problems can be overcome by strengthening or replacing the base material above the bedrock. The soil is generally not suited to septic tank absorption fields because of the fractured bedrock. Effluent from septic tank absorption fields can contaminate ground water supplies.

This soil is in capability subclass IIe.

509C2—Whalan loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex side

slopes. Areas are irregular in shape and range from 2 acres to more than 100 acres in size.

Typically, the surface layer is dark grayish brown loam about 7 inches thick. The subsoil is about 22 inches thick. The upper part is dark brown, friable clay loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is reddish brown, firm clay. The subsoil is over brownish yellow, dolomitic sand and fractured bedrock. In places, the subsoil is thicker than is typical and bedrock is at a depth of more than 40 inches. In places, the subsoil is thinner and shallower to bedrock than is typical. In some places, the reddish brown clay layer is more than 6 inches thick.

Included with this soil in mapping are Westville and Pecatonica soils. These well drained soils formed in loamy glacial drift, are devoid of bedrock, and are in similar positions on the landscape as Whalan soils. These soils make up 2 to 10 percent of the unit.

This Whalan soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 1.5 percent organic matter. It is difficult to till. The subsoil is neutral to strongly acid. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 36 inches by bedrock. The frost action potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. The hazard of erosion and low available water capacity are the major concerns for farming. Minimum tillage, contour farming, and cover crops help reduce soil losses and conserve moisture. If used for pasture, proper stocking, uniform grazing distribution, and a planned grazing system keep the pasture and soil in good condition.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation, or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

This soil is well suited to dwellings without basements but is only moderately suited to dwellings with basements. Construction costs increase because bedrock must be excavated. The upper few feet of the bedrock surface generally is rippable; medium sized construction equipment can be used. The soil is only moderately suited to local roads and streets, because soil strength and frost action are limitations. These problems can be overcome by strengthening or replacing the base material above the bedrock. The soil is generally not suited to septic tank absorption fields because of the fractured bedrock. Effluent from septic tank absorption fields can contaminate ground water supplies.

This soil is in capability subclass IIIe.

509D2—Whalan loam, 10 to 15 percent slopes, eroded. This strongly sloping, well drained soil is on ridges and convex side slopes. Areas are irregular in shape and range from 3 to 55 acres in size.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is about 20 inches thick. The upper part is dark brown, friable clay loam; the middle part is dark yellowish brown clay loam; and the lower part is reddish brown, firm clay. The subsoil is over brownish yellow, dolomitic sand and fractured bedrock. In places, the subsoil is thicker than is typical and bedrock is at a depth of more than 40 inches. In other places, the subsoil is thinner and shallower to bedrock than is typical.

Included with this soil in mapping are Martinsville and Pecatonica soils. Martinsville soils formed in loamy material. Pecatonica soils formed in reddish clay loam or sandy loam buried soils. The Martinsville and Pecatonica soils are well drained and are on similar positions on the landscape as this Whalan soil. They make up 2 to 5 percent of the unit.

This Whalan soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is rapid and available water capacity is low. The surface layer is about 1.5 percent organic matter. It is difficult to till. The subsoil is neutral to strongly acid. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 36 inches by limestone bedrock. The frost action potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. The erosion hazard and low available water capacity are the major concerns of farming. Minimum tillage, contour farming, and cover crops help reduce soil losses and conserve moisture. Proper stocking, uniform grazing distribution, and a planned grazing system keep pasture and soil in good condition.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation, or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

This soil is suited to dwellings without basements. The slope can be a limitation, and alteration is difficult because of the depth to bedrock. The soil is only moderately suited to dwellings with basements. The slope and depth to bedrock are limitations. Construction costs increase greatly because bedrock must be excavated. The upper few feet of the bedrock surface generally is rippable. It can be ripped with medium size construction equipment. The soil is only moderately suited to local roads and streets. Soil strength, frost action, and slope are limitations that can be overcome by strengthening or replacing the base material above the bedrock, but slope is difficult to overcome because of the moderate depth to bedrock. The soil is generally not suited to septic tank absorption fields because of the moderate depth to bedrock. Fractured bedrock can allow effluent to travel long distances and pollute the underground water supply.

This soil is in capability subclass IVe.

509E2—Whalan loam, 15 to 30 percent slopes, eroded. This moderately steep, well drained soil is on ridges and convex side slopes. Areas are irregular in shape and range from 3 to 75 acres in size.

Typically, the surface layer is very dark gray loam about 3 inches thick. The subsurface layer is dark brown and brown loam about 3 inches thick. The subsoil is about 18 inches thick. The upper part is dark brown, friable clay loam; the middle part is dark yellowish brown clay loam; and the lower part is reddish brown, firm clay. The subsoil is over brownish yellow dolomitic sand and fractured bedrock. In places, the subsoil is thicker than typical, and bedrock is at a depth of more than 40 inches.

Included with this soil in mapping are Fayette and Martinsville soils. Fayette soils formed in silty material, and Martinsville soils formed in loamy material. These soils are well drained and are in similar positions on the landscape as Whalan soils. They make up 2 to 10 percent of the unit.

The Whalan soil has moderate permeability in the upper part and slow permeability in the lower part of the subsoil. Surface runoff is rapid, and available water capacity is low. The surface layer is about 1.5 percent organic matter. The subsoil is neutral to strongly acid. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 36 inches by limestone bedrock. The frost action potential is moderate.

This soil is suited to grass and legume hay and pasture. The hazard of erosion and low available water capacity are the major concerns for farming. If the soil is used for pasture production, proper stocking, uniform grazing distribution, and a planned grazing system keep the pasture and soil in good condition.

This soil is suited to woodland. A few areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive with such good timber management as site preparation, spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

This soil is suited to openland or woodland wildlife habitat because it is suited to both woody or herbaceous plants. Wildlife habitat developments include trees, shrubs, grasses, and legumes. Protection from fire and grazing is essential.

This soil is generally not suited to dwellings and septic tank absorption fields. Slope is a limitation and is difficult to overcome because of the depth to bedrock.

This soil is in capability subclass VIe.

570A—Martinsville silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is mainly on stream terraces and outwash plains. Areas are irregular in shape and range from 4 to 60 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The subsurface layer is dark gray and brown silt loam about 7 inches thick. The subsoil is about 36 inches thick. The upper part is dark yellowish brown, friable silt loam and silty clay loam; the middle part is yellowish brown, friable clay loam; and the lower part is yellowish brown, friable sandy loam. The substratum, to a depth of 60 inches, is mottled yellowish brown, gray, and dark brown clay loam and silt loam. In places, the substratum is sand and gravel. Also, some areas are moderately well drained.

Included with this soil in mapping are small areas of somewhat poorly drained Whitaker soils and poorly drained Drummer soils. These soils are in drainageways or lower lying areas adjacent to Martinsville soils. They make up 10 to 20 percent of the unit.

This Martinsville soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is high. The surface layer is about 2 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 55 inches by mildly alkaline outwash.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage and cover crops help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability class I.

570B—Martinsville silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex positions on stream terraces and outwash plains. Areas are irregular in shape and range from 3 to 120 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The subsurface layer is dark gray and brown silt loam about 6 inches thick. The subsoil is about 35 inches thick. The upper part is dark yellowish brown, friable silt loam and silty clay loam; the middle part is yellowish brown, friable clay loam; and the lower part is yellowish brown, friable sandy loam. The substratum, to a depth of 60 inches, is mottled yellowish brown, strong brown, gray, and dark brown clay loam and silt

loam. In places, the substratum is sand and gravel. Also, in some places, the soil is moderately well drained.

Included with this soil in mapping are small areas of well drained Lamont and Whalan soils. Lamont soils have about 2 or 3 feet of sandy loam material over loamy sand or sand. Whalan soils have about 2 or 3 feet of loamy material over limestone bedrock. These soils make up 10 to 15 percent of the unit and are adjacent to Martinsville soils.

This Martinsville soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 2 percent organic matter. The surface layer crusts and puddles after hard rains especially in areas where the plow layer contains subsoil material. Th subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 55 inches by moderately alkaline outwash.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIe.

570C2—Martinsville silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on breaks of stream terraces and on convex side slopes on uplands. Areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown, friable silt loam and silty clay loam; the middle part is yellowish brown, friable clay loam; and the lower part is yellowish brown, friable sandy loam. The substratum, to a depth of 60 inches, is mottled, yellowish brown, gray, and dark brown clay loam or silt loam.

Included with this soil in mapping are small areas of well drained Lamont, Miami, and Whalan soils. Lamont soils have about 2 or 3 feet of sandy loam material over loamy sand or sand. Miami soils have loamy material over calcareous loam till. Whalan soils have about 2 to 3 feet of loamy material over limestone bedrock. These soils make up 10 to 15 percent of the unit and are adjacent to Martinsville soils.

This Martinsville soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 1.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 55 inches by moderately alkaline outwash.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is well suited to septic tank absorption fields.

This soil is in capability subclass IIIe.

570D2—Martinsville silt loam, 10 to 15 percent slopes, eroded. This sloping, well drained soil is on ridges and convex side slopes. Areas are irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The subsurface layer is dark gray and brown silt loam about 4 inches thick. The subsoil is about 32 inches thick. The upper part is dark yellowish brown, friable silt loam and silty clay loam; the middle part is yellowish brown, friable clay loam; and the lower part is yellowish brown, friable sandy loam. The substratum, to a depth of 60 inches, is mottled yellowish brown, gray, and dark brown clay loam or silt loam. In places, the upper part of the subsoil is mixed with the surface soil by plowing.

Included with this soil in mapping are small areas of well drained Eleva, Lamont, Miami, and Whalan soils. Eleva soils have sandy loam material to a depth of about 3 feet over sandstone bedrock. Lamont soils have sandy loam material over sand. Miami soils have about 3 feet

of loamy material over calcareous loam till. Whalan soils have about 2 or 3 feet of loamy material over limestone bedrock. These soils make up 10 to 15 percent of the unit and are adjacent to Martinsville soils.

This Martinsville soil has moderate permeability. Surface runoff from cultivated areas is rapid, and available water capacity is moderate. The surface layer is about 1.5 percent organic matter. It is difficult to till when eroded. It crusts after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is slightly acid to strongly acid. The shrink-swell potential is moderate in the subsoil. Root development is restricted below a depth of about 55 inches by moderately alkaline outwash.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to woodland. A few small areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main hazard or limitation to planting or harvesting trees.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings. The shrink-swell potential and slope are limitations. Foundations can be designed to overcome the shrinking and swelling, and the slope can be altered as required. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by replacing the base material. The soil is only moderately suited to septic tank absorption fields because of the slope. Placing the absorption field on the contour helps overcome this limitation.

This soil is in capability subclass IVe.

661B—Atkinson silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex ridgetops and knolls. Areas are irregular in shape and range from 3 to 150 acres in size.

Typically, the surface layer is very dark brown silt loam about 10 inches thick. The subsurface layer is very dark brown and very dark grayish brown silt loam about 4 inches thick. The subsoil is about 29 inches thick. The upper part is brown, friable silt loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is dark brown, friable loam, sandy clay loam, and silty clay. Below this is limestone bedrock.

Included with this soil in mapping are small areas of well drained Jasper soils that have loamy material over outwash. These soils make up 10 to 15 percent of the unit.

This Atkinson soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 4 percent organic matter. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is neutral. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 43 inches by limestone bedrock.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

This soil is suited to dwellings without basements, but it is only moderately suited to dwellings with basements because of the bedrock. It lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. It is generally not suited to septic tank absorption fields. Effluent from the fields can contaminate ground water supplies as a result of the rapid infiltration of limestone bedrock. The soil is a suitable source of agriculture lime and crushed rock.

This soil is in capability subclass IIe.

661C2—Atkinson silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on convex ridgetops and uneven side slopes. Areas are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is very dark brown silt loam about 8 inches thick. The subsurface layer is mixed with the surface layer by plowing. The subsoil is about 33 inches thick. The upper part is brown, friable silt loam; the middle part is dark yellowish brown, friable clay loam; and the lower part is dark brown, friable loam or sandy clay loam and silty clay. Under this is limestone bedrock. In many areas a layer of dark brown silty clay overlies the bedrock.

Included with this soil in mapping are small areas of well drained Jasper and Ogle soils. Jasper soils have loamy material to a depth of 3 to 4 feet over loamy outwash. Ogle soils have silty material to a depth of about 3 to 4 feet over reddish drift. These soils make up 10 to 15 percent of the unit.

This Atkinson soil has moderate permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is medium and available water capacity is moderate. The surface layer is about 3.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil

material. The subsoil is neutral. The shrink-swell potential is high in the subsoil. Root development is restricted below a depth of about 50 inches by limestone bedrock.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good condition.

This soil is suited to dwellings without basements. It is only moderately suited to dwellings with basements because of the bedrock. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. It is generally not suited to septic tank absorption fields. Effluent from the fields, however, can contaminate ground water supplies because of the rapid infiltration of limestone bedrock. The soil is a suitable source of agricultural lime and crushed rock.

This soil is in capability subclass IIe.

727B—Waukee loam, 1 to 5 percent slopes. This gently sloping, well drained soil is on uplands and slightly elevated terraces along streams. Areas of this unit are irregular in shape and range from 3 to 40 acres in size.

Typically, the surface layer is black loam about 10 inches thick. The subsurface layer is very dark grayish brown loam about 5 inches thick. The subsoil is about 26 inches thick. The upper part is dark yellowish brown, friable loam; the middle part is dark brown loam; and the lower part is yellowish brown loamy sand. The substratum, to a depth of 60 inches, is yellowish brown sand.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue soils. These soils are in slightly lower areas than Waukee soils, and they make up 2 to 5 percent of the unit. In other places, areas of gravel and sandstone are included in this unit.

This Waukee soil has moderate permeability in the subsoil and very rapid permeability in the underlying material. Available water capacity is moderate. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is medium acid or strongly acid.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration. Minimum tillage effectively maintains favorable soil tilth.

This soil is well suited to dwellings and septic tank absorption fields. There is a hazard of contaminating ground water supplies.

This soil is in capability subclass IIe.

728C2—Winnebago silt loam, 5 to 10 percent slopes, eroded. This sloping, well drained soil is on broad, convex ridgetops and upper slopes of uplands. Areas are irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil extends to a depth of more than 68 inches. The upper part is dark yellowish brown, friable clay loam; the middle part is yellowish red and red gravelly clay loam and clay loam; and the lower part is red, friable sandy clay loam. In a few places, the upper part of the subsoil is silty clay loam. In places, the subsoil is thinner than is typical and shallower to sandy loam glacial till that is high in content of lime. In some areas, slope is less than 5 percent. In a few places, sand is within a depth of 60 inches.

Included with this soil in mapping are small areas of Hitt and Rockton soils. These soils are in similar positions on the landscape as Winnebago soils, but they have fractured dolomitic bedrock at a depth ranging from 20 to 60 inches. They make up 2 to 5 percent of the unit.

This Winnebago soil has moderate permeability. Surface runoff from cultivated areas is medium, and available water capacity is high. The surface layer is about 3.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain, especially in areas where the plow layer contains subsoil material. The subsoil is medium acid or strongly acid. Root development is restricted below a depth of about 15 inches by compact, reddish loamy glacial till. The shrink-swell potential is moderate in the subsoil.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. If the soil is used for cultivated crops, further erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and terraces help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture or hay effectively controls erosion. Overgrazing or grazing when the soil is too wet, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep the pasture and soil in good ondition.

This soil is suited to dwellings. The shrink-swell potential is a limitation, but foundations can be designed to overcome this problem. The soil lacks sufficient strength and stability to support vehicular traffic, but this limitation can be corrected by strengthening or replacing the base material. The soil is only moderately suited to septic tank absorption fields. Permeability is a limitation for septic

tank absoprtion fields, but this problem can be overcome by increasing the size of the absorption field.

This soil is in capability subclass IIe.

742B—Dickinson sandy loam, loamy substratum, 1 to 5 percent slopes. This gently sloping, well drained soil is on low ridges shaped like dunes on upland drainage divides and stream terraces. Areas are irregular in shape and range from 2 to about 40 acres in size.

Typically, the surface layer is very dark gray, very friable sandy loam about 7 inches thick. The subsurface layer is very dark grayish brown and dark brown sandy loam about 13 inches thick. The subsoil is about 40 inches thick. The upper part is dark brown sandy loam, the middle part is dark yellowish brown loamy sand, and the lower part is yellowish brown sand. The substratum, to a depth of 60 inches, is dark yellowish brown and dark brown layers of loam, sandy loam, loamy sand, and sandy clay loam. In places, the subsoil and substratum contain silty material. Also, in some areas, the surface layer is thin and dark, or it is loamy sand.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue and Millbrook soils. These soils are in shallow depressions and drainageways. They make up 2 to 10 percent of the unit.

This Dickinson soil has rapid permeability in the subsoil and moderate permeability in the substratum. Surface runoff from cultivated areas is slow to medium, and available water capacity is moderate. The surface layer is about 2 percent organic matter. It is subject to soil blowing when dry. The subsoil is medium acid. The shrink-swell potential is low in the subsoil. The frost action potential is moderate.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. Erosion from both wind and water are hazards. Minimum tillage, cover crops, returning crop residue, and regular additions of other organic material to the soil reduce soil erosion and increase water intake. Contour farming and stripcropping also help control soil blowing and water erosion and conserve moisture. Heavy fertilizer applications generally are not economical because crop growth is limited by moderate available water capacity. Early planting in spring helps reduce the effect of summer drought.

This soil is suited to hay and pasture. Overgrazing increases drought stress and results in lower quality or death of existing forage and pasture stands. Proper stocking, pasture rotation, and timely deferment of grazing keep the pasture and soil in good condition.

This soil is well suited to dwellings and septic tank absorption fields. If the soil is used for septic tank absorption fields, pollution is a hazard to shallow underground aquifers as a result of the rapid permeability. Maintenance of lawns and shrubs requires additions of water during dry periods.

This soil is in capability subclass IIIe.

742C—Dickinson sandy loam, loamy substratum, 5 to 12 percent slopes. This sloping, well drained soil is on side slopes of ridges shaped like dunes on uplands and on stream terrace breaks. Areas are irregular in shape and range from about 2 to 40 acres in size.

Typically, the surface layer is very dark gray, friable sandy loam about 5 inches thick. The subsurface layer is very dark grayish brown and dark brown sandy loam about 12 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown sandy loam, the middle part is dark yellowish brown loamy sand, and the lower part is yellowish brown sand. The substratum, to a depth of 60 inches, is dark yellowish brown and dark brown layers of loam, sandy clay loam, loamy sand, and sandy loam. In places, the subsoil and substratum contain silty material. In some areas, the surface layer is thin and dark, or it is loamy sand.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue and Millbrook soils. These soils are in drainageways. They make up 2 to 10 percent of the unit.

This Dickinson soil has rapid permeability in the subsoil and moderate permeability in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 2 percent organic matter. It is subject to soil blowing when dry. The subsoil is medium acid. The frost action potential is moderate.

This soil is suited to small grain, grass and legume hay and pasture, and trees. It is not suited to corn and soybeans because of droughtiness, low fertility, and the erosion hazard. Minimum tillage, cover crops, returning crop residue and regular additions of organic matter maintain fertility, reduce water erosion and soil blowing, and increase water intake. Contour farming, terracing, and stripcropping also help to control erosion and conserve moisture. Heavy applications of fertilizer generally are not economical because crop growth is limited by moderate available water capacity. Early planting of annual crops in spring matures the crop before summer drought becomes severe.

This soil is suited to pasture and hay. Overgrazing increases drought stress and results in lower quality or death of existing forage and pasture stands. Proper stocking, pasture rotation, and timely deferment of grazing keep the pasture and soil in good condition.

This soil is well suited to dwellings and septic tank absorption fields. If the soil is used for septic tank absorption fields, pollution of shallow underground aquifers is a hazard as a result of the rapid permeability. Maintenance of lawns and shrubs requires additions of water during dry periods.

This soil is in capability subclass IIIe.

761B—Eleva sandy loam, 2 to 7 percent slopes. This gently sloping, well drained and somewhat excessively drained soil is on ridgetops and short side slopes. Areas are long and narrow or irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is very dark gray sandy loam about 4 inches thick. The subsurface layer is yel-

lowish brown sandy loam about 5 inches thick. The subsoil is about 23 inches thick. The upper part is yellowish brown, friable sandy loam; and the lower part is yellowish brown and brownish yellow, very friable loamy sand. The substratum, to a depth of 36 inches, is brownish yellow sand that overlies sandstone bedrock. In places, the subsoil is thicker and deeper to sandstone bedrock than is typical.

Included with this soil in mapping are small areas of somewhat poorly drained La Hogue soils in drainageways and small areas of well drained Chelsea, Lamont, and Martinsville soils. Martinsville soils have loamy outwash material to a depth of 60 inches. Lamont soils have sandy loam material to a depth of 60 inches. Chelsea soils have thin bands of sandy material to a depth of 60 inches. In areas, this soil has a slope of more than 7 percent. These soils make up about 10 to 15 percent of the unit.

Permeability is moderately rapid in the upper part of the subsoil and rapid in the lower part of the subsoil and in the substratum. Surface runoff from cultivated areas is medium, and available water capacity is low. The surface layer is about 1 percent organic matter. The subsoil is strongly acid. Root development is restricted below a depth of about 36 inches by sandstone bedrock.

This soil is suited to woodland. Many areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are few hazards or limitations to planting or harvesting trees.

This soil is suited to dwellings without basements and only moderately suited to dwellings with basements. Underlying sandstone bedrock limits construction. The soil is generally not suited to septic tank absorption fields because effluent from the fields can contaminate ground water supplies as a result of rapid seepage of sandstone bedrock.

This soil is in capability subclass IIIs.

761D—Eleva sandy loam, 7 to 15 percent slopes. This sloping and strongly sloping, well drained and somewhat excessively drained soil is on ridgetops and short side slopes. Areas are long or irregular in shape and range from 3 to 50 acres in size.

Typically, the surface layer is very dark gray and brown sandy loam about 3 inches thick. The subsurface layer is yellowish brown sandy loam about 4 inches thick. The subsoil is about 21 inches thick. The upper part is yellowish brown, friable sandy loam; the lower part is yellowish brown and brownish yellow, very friable loamy sand. The substratum, to a depth of 35 inches, is brownish yellow and yellowish brown sand that overlies sandstone bedrock. In places, the subsoil is thicker and deeper to sandstone bedrock than is typical.

Included with this soil in mapping are small areas of Chelsea and Martinsville soils. Chelsea soils have thin bands of sandy material to a depth of 60 inches. Martinsville soils have loamy outwash material to a depth of 60 inches. In places the soil has a slope of more than 15 percent or less than 7 percent. These soils make up about 10 to 15 percent of the unit.

This Eleva soil has moderately rapid permeability in the upper part of the subsoil and rapid permeability in the lower part of the subsoil and in the substratum. Surface runoff from cultivated areas is rapid, and available water capacity is low. The surface layer is about 1 percent organic matter. The subsoil is strongly acid. Root development is restricted below a depth of about 36 inches by sandstone bedrock.

This soil is suited to small grain and grass and legume hay and pasture. If the soil is used for cultivated crops, erosion damage is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Soil blowing can be reduced by cover cropping and windbreaks. Returning crop residue to the soil or regular additions of other organic material improves fertility. The soil is droughty.

This soil is suited to woodland. Many areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. Slope is the main limitation to planting or harvesting trees. The soil is droughty.

This soil is moderately suited to openland or woodland wildlife habitat because it is suited to both woody or herbaceous plants. Wildlife habitat developments can include trees, shrubs, grasses, and legumes. Protection from fire and grazing is essential.

This soil is only moderately suited to dwellings because of slope and depth to bedrock. The slope is difficult to alter because of the bedrock, and dwellings with basements are limited by the bedrock. The soil is generally not suited to septic tank absorption fields because of the bedrock.

This soil is in capability subclass IIIe.

761F—Eleva sandy loam, 15 to 35 percent slopes. This moderately steep and steep, well drained and somewhat excessively drained soil is on ridgetops and short side slopes. Areas are irregular in shape and range from 5 to 25 acres in size.

Typically, the surface layer is very dark gray sandy loam about 2 inches thick. The subsurface layer is yellowish brown sandy loam about 2 inches thick. The subsoil is about 18 inches thick. The upper part is yellowish brown, friable sandy loam; and the lower part is yellowish brown and brownish yellow, very friable loamy sand. The substratum, to a depth of 32 inches, is brownish yellow sand that overlies sandstone bedrock. In places, the subsoil is thinner and shallower to sandstone than is typical and the surface layer is absent. In some places, the soil has a slope of less than 15 percent.

Included with this soil in mapping are small areas of Martinsville soils that have loamy outwash to a depth of 60 inches. These soils make up about 10 to 15 percent of the unit.

This Eleva soil has moderately rapid permeability in the upper part of the subsoil and rapid permeability in the lower part of the subsoil and in the substratum. Surface runoff is very rapid, and available water capacity is low. The surface layer is about 1 percent organic matter. Root development is restricted below a depth of about 32 inches by sandstone bedrock.

This soil is suited to woodland. Most areas remain in native hardwoods. Tree seeds, cuttings, and seedlings survive and grow well with such good timber management as site preparation or spraying, cutting, or girdling. There are moderate limitations to planting or harvesting trees. The soil is droughty and steep. Soil blowing can be reduced by using windbreaks.

This soil is moderately suited to openland and woodland wildlife habitat because it is suited to woody or herbaceous plants. Wildlife habitat developments can include trees, shrubs, grasses, and legumes. Protection from fire and grazing is essential.

This soil is generally not suited to dwellings and septic tank absorption fields because of slope and depth to bedrock.

This soil is in capability subclass VIe.

776—Comfrey clay loam. This nearly level or depressional, poorly drained soil is in alluvial areas. It is subject to occasional, brief flooding from April to July. Areas are generally long and range from 2 acres to several hundred acres in size.

Typically, the surface layer is black clay loam about 7 inches thick. The subsurface layer is black clay loam and loam about 28 inches thick. The substratum, to a depth of 60 inches, is mottled, dark gray, very dark gray, and dark grayish brown loam. In places, the dark colored surface layer is more than 60 inches thick. Also, in places, there are well drained alluvial areas that are subject to occasional overflow.

Included with this soil in mapping are small areas of somewhat poorly drained Orion soils; poorly drained Drummer, Millington, and Selma soils; and well drained Ross soils. Drummer, Millington, and Selma soils are on landscape positions similar to Comfrey soils. Orion and Ross soils are adjacent to Comfrey soils but are on slightly higher parts of the landscape.

This Comfrey soil has moderate permeability. Surface runoff from cultivated areas is slow, and available water capacity is high. A seasonal high water table is at or near the surface. The surface layer is about 5 percent organic matter. Reaction is neutral or mildly alkaline.

This soil is suited to corn, soybeans, small grain, and grass and legume hay and pasture. It requires artificial drainage to reach maximum potential if used for cultivated crops. A system of subsurface drains and surface ditches help if suitable outlets are available. A levee or dike system helps protect some areas from overflow.

This soil is suited to wetland wildlife habitat. Birds and mammals have access to a large variety of wetland plants and shallow water areas. Restraint from artificial drainage promotes better conditions for wetland wildlife habitat.

Some areas are used for pasture. Overgrazing when the soil is wet causes compaction and lower pasture quality. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep pasture and soil in good condition.

This soil is generally not suited to dwellings and septic tank absorption fields because of the flooding hazard and seasonal high water table.

This soil is in capability subclass IIw.

779B—Chelsea loamy sand, 1 to 7 percent slopes. This gently sloping, excessively drained soil is on low, hummocky dunes on broad stream terraces and uplands. Areas are crescent or irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is very dark brown loamy sand about 3 inches thick. The subsurface layer is yellowish brown sand 35 inches thick. It has thin bands of brown loamy sand in the lower part. The subsoil, to a depth of 60 inches, is brownish yellow sand that has thin layers of brown loamy sand. In some places, the surface layer and subsoil are sandy loam. In other places, gravel is at a depth of less than 60 inches. The surface layer is darker colored than is typical in a few places.

Included with this soil in mapping are small areas of somewhat excessively drained, sandy Eleva soils in which sandstone bedrock is at a depth of 20 to 40 inches.

This Chelsea soil has rapid permeability. Surface runoff is medium, and available water capacity is low. The surface layer is about 1 percent organic matter. The subsurface layer is medium acid or slightly acid.

The soil is poorly suited to cultivated crops because it is too droughty. Controlling soil blowing and maintaining soil fertility are additional concerns. Leaving residue on the surface is effective in reducing soil blowing and conserving soil moisture.

Using this soil for Christmas tree production effectively controls soil blowing and conserves soil moisture. A few small areas remain in native hardwoods. Seedling mortality is high as a result of droughtiness, but can be partly overcome by good timber management. Protection from livestock and fire is needed. Some suitable trees include red pine, eastern white pine, and jack pine.

This soil is moderately suited to openland wildlife habitat. Grass and legume mixtures and wild herbaceous plants furnish cover and food for openland wildlife.

Using this soil for hay and pasture effectively controls erosion by wind and water. Overgrazing, however, causes poor vegetative growth and increased plant mortality. Proper stocking, pasture rotation, weed control, fertilization, and timely deferment of grazing keep the pasture and soil in good condition.

This soil is well suited to dwellings and septic tank absorption fields. Ground water pollution is a hazard if septic tank absorption fields are installed.

This soil is in capability subclass IVs.

779D—Chelsea loamy sand, 7 to 15 percent slopes. This sloping to strongly sloping, excessively drained soil is on low, hummocky dunes on broad high terraces and rolling uplands. Areas are crescent or irregular in shape and range from 2 to 40 acres in size.

Typically, the surface layer is very dark brown loamy sand about 3 inches thick. The subsurface layer is yellowish brown sand 35 inches thick. It has thin bands of brown loamy sand in the lower part. The subsoil, to a depth of 60 inches, is brownish yellow sand with thin layers of brown and strong brown loamy sand. In some places, gravel is at a depth of less than 60 inches. A few places have a darker colored surface layer.

Included with this soil in mapping are small areas of excessively drained Eleva soil. This soil has sandstone bedrock at a depth of 20 to 40 inches.

This Chelsea soil has rapid permeability. Surface runoff is medium to rapid, and available moisture capacity is low. The surface layer is about 1 percent organic matter. The subsurface layer is medium acid or slightly acid.

This soil is not suited to cultivated crops. Droughtiness, low fertility, and excessive slope limit crop growth. When cultivated, the soil is subject to damage by soil blowing and water erosion.

Using this soil for Christmas tree production effectively controls soil blowing and conserves soil moisture. A few small areas remain in hardwoods. Seedling mortality is high as a result of droughtiness, but this can be partly overcome by good timber management. The soil needs protection from livestock and fire. Some suitable trees are red pine, eastern white pine, and jack pine.

This soil is moderately suited to openland wildlife habitat. Food and cover should be established as required. Grass and legume mixtures and wild herbaceous plants furnish cover and food for openland wildlife. Special site preparation is necessary to establish vegetation in some eroded or "blowout" areas.

This soil is only moderately suited to dwellings and septic tank absorption fields. Slope is a limitation. This problem can be overcome for dwellings by land shaping and minimized for septic tank absorption fields by placing them on the contour.

This soil is in capability subclass VIs.

802—Orthents, loamy. This map unit consists of moderately fine textured to moderately coarse textured soils that have been mixed by filling and leveling. There is a wide range of soil material. Slope is mainly 0 to 3 percent but ranges to about 15 percent.

The mixed soil material in this unit is mostly silty and loamy in the surface layer and is clay loam, loam, or silty clay loam in the subsoil. The underlying loamy glacial deposits are also mixed. The soil material is commonly 2 to 5 feet thick.

Included with this unit in mapping are some borrow areas near highways. Highway interchanges, toll stations, rest areas, and large right-of-ways are included. Some pits, where sand and gravel is extracted for construction, are also included. Some places, mainly within urban areas, are as much as 65 percent concrete, asphalt, buildings, steets, and parking lots. Also included are areas that have been or are being used for sanitary landfills.

In Orthents, loamy, permeability is too variable to rate because the soil has been compacted by construction equipment and is variable. Surface runoff is medium to rapid. The available water capacity varies but generally is moderate. This map unit is generally low in organic matter and plant nutrients. Erosion is severe in areas not protected by vegetation.

The vegetation ranges from none in new exposures to good grass sod in some developed areas. Sparse to dense stands of weeds cover older exposures of this map unit. Most areas are idle or are in residential and other nonfarm uses.

Orthents, loamy, is not assigned to a capability subclass.

864—Pits, quarries. This map unit consists mainly of quarries where limestone bedrock has been removed or broken and stockpiled. Also in this unit is one sandstone quarry southwest of Oregon. Soil material generally is dolomitic limestone that ranges from sand to boulder in size. Slope ranges from nearly level on the quarry floor to nearly vertical on the quarry face. Areas range from about 2 acres to more than 100 acres in size.

Most areas of this unit are idle unless currently being excavated. The map unit has poor potential for sanitary facilities. It has fair potential for recreation, especially after excavating has stopped.

Some areas of this unit that have water in the excavation provide a potential habitat for fish and waterfowl. Recreational fishing and swimming are possible in these areas.

Some smaller, abandoned quarries are used for local solid waste disposal. Some larger quarries are being used for sanitary landfill sites for large municipalities. Special precautions are needed to guard against underground water pollution if this map unit is used for solid waste disposal.

Pits, quarries, is not assigned to a capability subclass.

865—Pits, gravel. This map unit consists of material that has been mixed by excavating or stockpiling. Soil material is mainly sandy or gravelly. Slope ranges from 0 to more than 30 percent. Areas range from about 2 acres to more than 100 acres in size.

The soil material in this unit consists mostly of sandy or gravelly substratum material, but some areas are in loam or sandy loam glacial till. The surface and subsoil materials have been removed or mixed during excavation.

Permeability and available water capacity are extremely variable. Reaction is generally mildly alkaline to strongly alkaline. Organic matter content is generally low.

Most areas of this unit are idle unless currently being excavated. The map unit has poor potential for cultivated crops, hay and pasture. It has poor potential for building site development and sanitary facilities. It has fair potential for recreation, especially after excavating has stopped.

Some areas of this unit that have water in the excavation provide a potential habitat for fish and waterfowl. Recreational fishing and swimming are also possible in these areas.

The nearly level floor of a large pit is a potential site for park or playground facilities or in some cases for landfill. If the unit is used for solid waste disposal, special precautions to guard against groundwater pollution are necessary.

Pits, gravel is not assigned to a capability subclass.

919C—Rodman-Fox complex, 5 to 12 percent slopes. This complex consists of sloping, well drained and excessively drained soils on upland kames and eskers and on stream terrace breaks. Areas range from 2 acres to about 40 acres in size.

This map unit is about 40 to 55 percent Rodman soils and 30 to 40 percent Fox soils. Rodman soils are on sharp slope breaks and narrow ridges, and Fox soils are on broader ridges and lesser side slopes. Areas of the Rodman and Fox soils are so intricately mixed or so small in size that it is not practical to map them separately.

Typically, the Rodman soil has a surface layer of very dark brown gravelly loam about 10 inches thick. The substratum, to a depth of 60 inches, is dark yellowish brown, calcareous sand and gravel. In some places, calcareous sand and gravel are at the surface.

Typically, the Fox soil has a surface layer of very dark grayish brown loam about 5 inches thick. The subsoil is about 28 inches thick. The upper part is dark yellowish brown, friable loam; the lower part is dark brown gravelly clay loam. The substratum, to a depth of about 60 inches, is yellowish brown, moderately alkaline sand and gravel. In some areas, the surface layer is thinner than is typical and the subsoil is mixed with the surface layer by plowing. In a few places, the surface layer contains more sand.

Included with these soils in mapping are small areas of well drained Martinsville soils. These included soils contain more silt and clay in the substratum than the Rodman and Fox soils. They make up 5 to 10 percent of the unit.

Permeability of the Rodman soil is very rapid and permeability of the Fox soil is moderate in the subsoil and rapid in the substratum. The available water capacity of the Rodman soil is low and of the Fox soil is moderate. In both soils the surface layer is about 2 percent organic matter. Surface runoff from cultivated areas is medium to rapid. Rooting depth is restricted by calcareous sand and gravel. The shrink-swell potential of the Rodman soil is low, and the shrink-swell potential of the Fox soil is moderate.

These soils are suited to small grain and grass and legume hay and pasture. Because the root zone is shallow, corn and soybeans are particularly affected by drought during dry periods. If these soils are used for cultivated crops, further erosion is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss.

Using these soils for woodland is effective in controlling erosion. Maintaining an adequate vegetative cover and ground mulch helps prevent excessive soil losses and improves the moisture supplying capacity of the soils by reducing runoff. A few areas remain in woodland.

These soils are only moderately suited to dwellings because of slope and the shrink-swell potential of the Fox soil. The slope is difficult to alter because of the depth to sand and gravel. The soils are only moderately suited to septic tank absorption fields because of slope; placing the fields on the contour helps to overcome this limitation. There is a hazard of effluent traveling long distances and polluting shallow underground aquifers. This hazard is somewhat less on Fox soils than on Rodman soils. The soils are a suitable source of sand and gravel.

This map unit is in capability subclass VIs.

919E—Rodman-Fox complex, 12 to 20 percent slopes. This complex consists of moderately steep, well drained and excessively drained soils on upland kames and eskers and on stream terrace breaks. Areas are linear in shape and range from 2 acres to about 30 acres in size.

This map unit is about 50 to 65 percent Rodman soils and 20 to 30 percent Fox soils. Rodman soils are on sharp slope breaks and narrow ridges, and Fox soils are on broader ridges and lesser side slopes. Areas of the Rodman and Fox soils are so intricately mixed or so small that it is not practical to map them separately.

Typically, the Rodman soil has a surface layer of very dark brown gravelly loam about 8 inches thick. The substratum, to a depth of 60 inches, is stratified yellowish brown, brownish yellow, and dark brown very gravelly coarse sand, very gravelly loamy coarse sand, and gravelly coarse sand. In some places, calcareous sand and gravel are at the surface.

Typically, the Fox soil has a surface layer of very dark grayish brown loam about 5 inches thick. The subsoil is about 28 inches thick. The upper part is dark yellowish brown, friable loam, and the lower part is dark brown gravelly clay loam. The substratum, to a depth of about 60 inches, is dark brown and light yellowish brown, moderately alkaline sand and gravel. In some places, the surface layer is dark colored, and, in a few areas it contains more sand. In some areas, sandy loam glacial exposures are indicated on the soil map by the till spot symbol.

Included with these soils in mapping are small areas of well drained Martinsville soils. These included soils con-

tain more silt and clay in the substratum than the Rodman and Fox soils. They make up 5 to 10 percent of the unit.

Permeability of the Rodman soil is very rapid in the subsoil. Permeabilty of the Fox soil is moderate in the subsoil and rapid in the substratum. Available water capacity of the Rodman soil is low. Available water capacity of the Fox soil is moderate in the subsoil and low in the substratum. In both soils, organic matter content is about 2 percent. Surface runoff is rapid. Rooting depth is restricted by calcareous sand and gravel. The shrink-swell potential of the Rodman soil is low, and that of the Fox soil is moderate.

The soils of this map unit are poorly suited to corn, soybeans, small grain, and hay. Steep slopes make seeding and harvesting difficult. Restricted rooting depth and limited available water capacity indicate severe droughtiness.

These soils are suited to woodland. Using these soils for woodland reduces erosion. Where possible, harvest cuttings should be light to leave the woodland intact. Careful felling, skidding, and hauling protect desirable uncut trees, seedlings, and shrubs. Care must be taken during harvesting because of the steep slopes.

These soils are poorly suited to dwellings and septic tank absorption fields because of slope. This limitation can be overcome, however, by cutting and shaping. There is a hazard of effluent traveling long distances and polluting shallow underground aquifers. Sanitary facilities should be part of a community treatment system. The soils are a source of sand and gravel.

This map unit is in capability subclass VIs.

939C—Rodman-Warsaw complex, 5 to 12 percent slopes. This complex consists of sloping, well drained and excessively drained soils on upland kames and eskers and on stream terrace breaks. Areas range from 2 acres to about 40 acres in size.

This map unit is about 40 to 55 percent Rodman soils and 30 to 40 percent Warsaw soils. Rodman soils are on sharp slope breaks and narrow ridges, and Warsaw soils are on broader ridges and lesser slopes. Areas of the Rodman and Warsaw soils are so intricately mixed or so small in size that it is not practical to map them separately.

Typically, the Rodman soil has a surface layer of very dark brown gravelly loam about 9 inches thick. The substratum, to a depth of 60 inches, is dark yellowish brown, stratified, calcareous sand and gravel. In some places, calcareous sand and gravel are at the surface.

Typically, the Warsaw soil has a surface layer of very dark brown loam about 6 inches thick. The subsurface layer is very dark brown and very dark grayish brown loam about 10 inches thick. The subsoil is about 20 inches thick. The upper part is brown, friable clay loam; the lower part is dark reddish brown gravelly loam. The substratum, to a depth of about 60 inches, is yellowish brown, moderately alkaline sand and gravel. In some areas, the surface is thinner than typical and subsoil is mixed with the surface layer by plowing. In a few places, the surface layer contains more sand. Included are some areas where calcareous sand and gravel are between depths of 15 and 24 inches.

Included with these soils in mapping are small areas of well drained Jasper soils. These included soils contain more silt and clay in the substratum than the Rodman and Warsaw soils. They make up 2 to 5 percent of the unit.

Permeability of the Rodman soil is very rapid and of the Warsaw soil is moderate in the subsoil and very rapid in the substratum. Available water capacity of the Rodman soil is low and of the Warsaw soil is moderate. In both soils the surface layer is about 3 percent organic matter. Surface runoff from cultivated areas is medium. Rooting depth is restricted by calcareous sand and gravel. The shrink-swell potential is low.

This map unit is best suited to small grain and grass and legume hay and pasture. Because the root zone is shallow, corn and soybeans are particularly affected by drought during dry periods. If these soils are used for cultivated crops, erosion is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss.

Using these soils for pasture or hay crops is effective in controlling erosion. Maintaining an adequate vegetative cover and ground mulch helps prevent excessive soil losses and improves the moisture supplying capacity by reducing runoff. Proper stocking and a planned grazing system keep the pasture and soil in good condition.

These soils are only moderately suited to dwellings because of slope. The slope of the Rodman soil is difficult to alter because it is shallow over sand and gravel. The soils are moderately suited to septic tank absorption fields because of slope; placing the field on the contour helps overcome this limitation. There is a possible hazard of ground water contamination because the substratum is permeable. This hazard is somewhat less on Warsaw soils than on Rodman soils. The soils are a source of sand and gravel.

This map unit is in capability subclass VIs.

939E—Rodman-Warsaw complex, 12 to 20 percent slopes. This complex consists of moderately steep, well drained and excessively drained soils on upland kames and eskers and on stream terrace breaks. Areas are linear in shape and range from 2 to about 30 acres in size.

This map unit is about 50 to 65 percent Rodman soils and 20 to 30 percent Warsaw soils. Rodman soils are on sharp slope breaks and narrow ridges, and Warsaw soils are on broader ridges and lesser slopes. Areas of the Rodman and Warsaw soils are so intricately mixed or so small in size that it is not practical to map them separately.

Typically, the Rodman soil has a surface layer of very dark brown gravelly loam about 7 inches thick. The sub-

stratum, to a depth of 60 inches, is dark yellowish brown, calcareous sand and gravel. In some places, calcareous sand and gravel are at the surface.

Typically, the Warsaw soil has a surface layer of very dark brown loam about 6 inches thick. The subsurface layer is very dark brown and very dark grayish brown loam about 8 inches thick. The subsoil is about 18 inches thick. The upper part is brown, friable clay loam, and the lower part is dark reddish brown gravelly loam. The substratum, to a depth of about 60 inches, is yellowish brown, moderately alkaline sand and gravel. In some places the surface layer is light colored, and in a few areas it contains more sand. In some areas, exposed sandy loam glacial till is indicated on the soil map by the symbol for till spots.

Included with these soils in mapping are small areas of well drained Jasper soils. These included soils contain more silt and clay in the substratum than the Rodman and Warsaw soils. They make up 2 to 4 percent of the unit.

Permeability of the Rodman soil is very rapid and of the Warsaw soil is moderate in the subsoil and very rapid in the substratum. Available water capacity of the Rodman soil is low and of the Warsaw soil is moderate. In both soils the surface layer is about 3 percent organic matter. Surface runoff is medium. Rooting depth is restricted by calcareous sand and gravel. The shrink-swell potential is low.

Using these soils for pasture is effective in controlling erosion. Proper stocking and a planned grazing system keep the pasture and soil in good condition.

These soils are poorly suited to dwellings and septic tank absorption fields because of slope and the permeable underlying material. Cutting and shaping the soils help overcome the slope limitation. If effluent travels long distances, there is a hazard of pollution to shallow underground aquifers. Sanitary facilities must be connected to community treatment facilities. The soils are a source of sand and gravel.

This map unit is in capability subclass VIs.

4776—Comfrey clay loam, ponded. This nearly level or depressional, poorly drained soil is in alluvial areas throughout the county. It is subject to frequent flooding for long periods from April to July. Areas generally are linear in shape and range from 2 to 40 acres in size.

Typically, the surface layer is black clay loam about 7 inches thick. The subsurface layer is black clay loam about 28 inches thick. The underlying material, to a depth of 60 inches, is stratified, dark grayish brown, very dark gray, or grayish brown loam, sandy loam, loamy sand, or sand. In places, the dark colored surface layer is more than 60 inches thick. In other places, the surface layer is light colored. In places, this alluvial soil is well drained and is subject to occasional overflow.

Included with this soil in mapping are small areas of somewhat poorly drained Orion soils and poorly drained Drummer, Millington, and Selma soils. Drummer, Millington, Selma, and Comfrey soils are on similar positions on the landscape. Orion soils are adjacent to Comfrey soil and slightly higher on the landscape. Also included are very poorly drained muck or peat soils.

This Comfrey soil has moderate permeability. Surface runoff is slow to very slow or the soil is ponded, and available water capacity is high. A seasonal high water table is at or near the surface. The surface layer is about 7 percent organic matter. The soil is neutral or mildly alkaline.

This soil is not suited to corn, soybeans, small grain, and grass and legume hay and pasture unless it is drained and protected from flooding. It requires artificial drainage to reach maximum potential when used for cultivated crops. A system of subsurface drains and surface ditches helps if suitable outlets are available. A levee or dike system helps protect some areas from overflow.

Some areas of this soil are used for pasture. Overgrazing when the soil is wet causes compaction and lower pasture quality. Proper stocking, pasture rotation, timely deferment of grazing, and restricted use during wet periods keep pasture and soil in good condition.

This soil is suited to wetland wildlife habitat. Birds and mammals have access to a large variety of wetland plants and shallow water areas on this soil. Restraint from artificial drainage promotes better conditions for wetland wildlife habitat.

This soil is generally not suited to dwellings and septic tank absorption fields because of the ponding, seasonal high water table, and flooding.

This soil is in capability subclass VIw.

6506B—Hitt Variant, sandy loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on convex upper side slopes and tops of ridges on uplands. Areas are irregular in shape and range from 2 to 60 acres in size.

Typically, the surface layer is very dark gray sandy loam about 6 inches thick. The subsurface layer is very dark gray sandy loam about 9 inches thick. The subsoil is about 29 inches thick. The upper part is dark brown, brown, and yellowish brown sandy loam; the middle part is dark brown loam; and the lower part is reddish brown clay loam and dark reddish brown clay. Fractured dolomitic limestone bedrock underlies the subsoil. In places, the surface layer is thinner than is typical. Fractured bedrock is within a depth of 20 to 40 inches in places.

Included with this soil in mapping are small areas of well drained Ogle soils. These soils are in areas similar to Hitt soils, but they do not have bedrock within 60 inches of the surface. They make up 2 to 5 percent of the unit.

This Hitt Variant has moderately rapid permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 3 percent organic matter. It crusts or puddles after hard rain. The subsoil is strongly acid to

slightly acid. The shrink-swell potential is moderate in the subsoil.

This soil is suited to row crops, hay, and pasture. If used for cultivated crops, damage by water erosion is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material improves fertility, reduces crusting, and increases water infiltration.

This soil is only moderately suited to dwellings because the shrink-swell potential and depth to bedrock are limitations. Foundations, however, can be designed to overcome the shrinking and swelling. Dwellings with basements require the excavation of the bedrock in places. The soil is generally not suited to septic tank absorption fields because of the slow permeability in the upper part and depth to bedrock. Sanitary facilities must be connected to community sanitary treatment facilities.

This soil is in capability subclass IIe.

6506C—Hitt Variant, sandy loam, 5 to 10 percent slopes. This sloping, well drained soil is on convex side slopes on uplands. Areas are irregular in shape and range from 2 to 30 acres in size.

Typically, the surface layer is very dark gray sandy loam about 6 inches thick. The subsurface layer is very dark gray sandy loam about 3 inches thick. The subsoil is about 32 inches thick. The upper part is brown and yellowish brown sandy loam, the middle part is dark brown loam, and the lower part is reddish brown clay loam and dark reddish brown clay. Fractured dolomitic limestone bedrock underlies the subsoil. In places, the surface layer is thinner, and the bedrock is closer to the surface than is typical. In some areas, the subsurface is mixed with the surface layer by plowing.

Included with this soil in mapping are small areas of Ogle soils. These soils are in areas similar to Hitt soils, but they do not have bedrock within 60 inches of the surface. They make up 2 to 5 percent of the unit.

This Hitt Variant has moderately rapid permeability in the upper part of the subsoil and slow permeability in the lower part. Surface runoff from cultivated areas is medium, and available water capacity is moderate. The surface layer is about 2.5 percent organic matter. It is difficult to till. It crusts or puddles after hard rain. The subsoil is strongly acid to slightly acid. The shrink-swell potential is moderate in the subsoil.

This soil is suited to row crops, hay, and pasture. If used for cultivated crops, damage by water erosion is a hazard. Minimum tillage, contour farming, cover crops, and grassed waterways help prevent excessive soil loss. Returning crop residue to the soil or regular additions of other organic material maintains fertility, reduces crusting, and increases water infiltration.

Using this soil for pasture and hay effectively controls erosion. Overgrazing, however, causes surface compaction, excessive runoff, and poor tilth. Proper stocking, pasture rotation, weed control, and timely deferment of grazing keep the pasture and soil in good condition.

This soil is only moderately suited to dwellings because the shrink-swell potential and depth to bedrock are limitations. Foundations, however, can be designed to overcome the shrinking and swelling of the soil. Dwellings with basements require excavation of the bedrock in places. The soil is generally not suited to septic tank absorption fields because of slow permeability in the lower part and depth to bedrock. Sanitary facilities must be connected to community sanitary treatment facilities.

This soil is in capability subclass IIe.

Use and management of the soils

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

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

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and 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

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 Conserva-

tion 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 440,954 acres in the survey area were used for crops and pasture in 1974, according to the 1974 Census of Agriculture. Of this total 14,713 acres were used for permanent pasture; 280,000 acres for row crops, mainly corn and soybeans; 47,845 acres for close-grown crops, mainly wheat, oats, rotation hay and pasture and other crops. The remaining 50,000 acres were used for vegetable crops. Much of the rotation hay and pasture has been converted to cropland because of the increased emphasis on row crop production.

The potential of the soils in the survey area for increased production of food is very good. A very limited number of acres of potentially good cropland are currently being used as woodland or pasture. Food production could be increased considerably by the reserve productive capacity represented by this land and by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

Soil erosion is the major soil problem on about 71 percent of the cropland and pasture in the survey area. If the slope is more than 2 percent, erosion is a hazard. Ashdale, Fayette, Flagg, Griswold, and Tama soils, for example, have slopes of 2 to 5 percent, and are easily eroded.

Loss of the surface layer through 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 on soils that have a clay loam subsoil, such as the Westville and Winnebago soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include Paleosols (old buried soils), as in Assumption and Elco soils, or bedrock as in Atkinson, Boone, Dunbarton, Dubuque, Eleva, Palsgrove, Ripon, Rockton, Sogn, Whalan and Woodbine soils. Erosion also reduces productivity on soils that tend to be droughty, such as Warsaw loam and Sparta loamy sand. Second, soil erosion results in sediment entering streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Conservation practices provide protective surface cover, reduce runoff, and increase infiltration. Cropping systems that keep vegetative cover on the soil surface throughout the year can hold soil erosion losses to amounts that do not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land and also provide nitrogen and improve tilth for the following crop.

On some areas of the strongly sloping Dunbarton, Fayette, Kidder, Martinsville, Miami, Pecatonica, Sogn, Whalan and Westville soils, slopes may be too short or irregular for contour tillage or terracing to be practical. In these areas, such conservation practices as cropping systems that provide substantial vegetation cover, conservation tillage, and crop residue management, are required to control erosion.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained soils that have regular slopes. Tama, Fayette, and Downs soils are very suitable for terraces. Some other soils are less suitable for terracing and diversions because of irregular slopes, excessive wetness in the terrace channels, a clayey subsoil that would be exposed in terrace channels, or bedrock at a depth of less than 40 inches.

Contour farming and terracing are widespread erosion control practices in the survey area. They are best adapted to soils that have smooth, uniform slopes but can often be successfully used on the slopes that are not uniform.

Soil blowing is a hazard on the sandy Chelsea, Dickinson, Lamont, and Sparta soils. Soil blowing can damage these soils in a few hours if winds are strong and the soils are dry and bare of vegetation or surface mulch. Maintaining vegetative cover, surface mulch, or rough surfaces through proper conservation tillage methods minimizes soil blowing on these soils. Field windbreaks of adapted shrubs, such as Tatarian honeysuckle or autumn-olive, or trees, such as red and white pine, are effective in reducing wind erosion on the muck or sandy soils.

Information for the design of erosion control practices for each kind of soil is contained in the Technical Guide, available in local offices of the Soil Conservation Service.

Soil drainage is the major management need on about 22 percent of the acreage used for crops and pasture in the survey area. Some soils are naturally so wet that the production of crops common to the area is generally not possible without artificial drainage. These are the poorly drained and very poorly drained Canisteo, Comfrey, Drummer, Houghton, Millington, Sable, Sawmill, and Selma soils, which make up about 48,337 acres in the survey area.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged most years. In this category are the Atterberry, Elburn, Flanagan, Kendall, La Hogue, Lawson, Millbrook, Muscatine, Odell, Orion, Radford, and Stronghurst soils, which make up about 65,212 acres.

Assumption and Elco soils have good natural drainage most of the year, but they tend to have seeps after heavy rains. Small areas of wetter soils along drain-

ageways and in swales are commonly included in areas of the well drained or moderately well drained Downs, Fayette, Flagg, Jasper, Ogle, Parr, Plano, Tama, and Varna soils, that have slopes of 2 to 5 percent. Artificial drainage is needed in some of these wetter areas.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and subsurface drainage is needed in most areas of the poorly drained soils used for intensive row cropping. Drains have to be more closely spaced in soils with slower permeability than in the more permeable soils. Most of the soils in the survey areas have adequate permeability for proper functioning of a subsurface drainage system. Finding adequate outlets for drainage systems is difficult in many areas of Canisteo, Comfrey, Millington, and Sawmill soils.

Soil fertility is naturally moderate to high in most soils of the uplands in the survey area. The soils on flood plains, such as Canisteo, Comfrey, Lawson, Millington, Orion, Radford, and Sawmill soils, range from slightly acid to moderately alkaline and are naturally higher in plant nutrients than most upland soils.

Many upland soils are naturally slightly acid or medium acid in the surface layer, and if they have never been limed they require applications of ground limestone to raise the pH level sufficiently for good growth of alfalfa and other crops. Available phosphorus and potash levels are naturally medium to high in most of these soils. On 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 level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Most soils used for crops in the survey area have a silt loam or loam surface layer that is dark or moderately dark in color and moderate or high in content of organic matter. Generally the structure of such soils is moderate and intense rainfall can cause the formation of a crust on the surface if all crop residue is removed. The crust is hard when it is dry, and it is nearly impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residues, manure, and other organic material can help to improve soil structure and to reduce crust formation. Conservation tillage methods such as no-till or chisel planting can improve soil structure and prevent or nearly prevent crust formation.

Fall moldboard plowing is generally not a good practice on the county's light-colored soils that have a silt loam surface layer because of the crust that forms during the winter and spring. After fall moldboard plowing, many of the soils are nearly as dense and hard at planting time as they were before they were plowed.

In the dark colored Sable and Sawmill soils that have considerable clay, tilth is a problem because the soils often stay wet until late in spring. If they are wet when plowed, they tend to be very cloddy when dry and good seedbeds are difficult to prepare. Fall plowing generally results in good tilth in the spring. Fall chisel plowing is generally as effective as moldboard plowing.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn and soybeans, are the major row crops. Grain sorghum, sunflowers, and similar crops can be grown if economic conditions are favorable.

Wheat and oats are the common close-growing crops. Rye, barley, buckwheat, an flax could be grown, and seed could be produced from bromegrass, fescue, bluegrass, red clover, crownvetch.

Special crops grown commercially in the survey area are vegetables such as peas, sweetcorn, tomatoes, beans, pumpkins and asparagus. Apples and cherries are the most important tree fruits grown in the county.

Deep soils that have good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. Some of those in the survey area are Downs, Jasper, Myrtle, Ogle, Parr, Plano, and Tama soils that have slopes of less than 6 percent. Also, if irrigated, Chelsea, Dickinson, Fox, Lamont, Sparta, Warsaw, and Waukee soils that have slopes of less than 7 percent are very well suited to vegetables and small fruits. Crops can generally be planted and harvested earlier on all of these soils than on the other soils in the survey area.

Most of the well drained soils in the survey area are suitable for orchards and nursery plants. Soils in low positions where frost is frequent and air drainage is poor, however, generally are poorly suited to early vegetables, small fruits, and orchards.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 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.

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.

Capability classes and subclasses

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*5*). 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

Ogle County has 30,800 acres of woodland. This acreage represents 6.4 percent of the acreage in Ogle County.

The principal forest cover types found in this county as defined by the Society of American Foresters are: Northern Red Oak-Basswood-White Ash; White Oak-Red Oak-Hickory; White Oak; White Pine; and Silver Maple-American Elm. Many more commercial tree species are associated with these cover types.

Of the 7 sawmills capable of producing lumber, only the 2 sawmills near Oregon are in commercial operation. Ogle County has excellent potential for wood crops. Only 13 percent of the woodland acreage is receiving proper timber management. In addition, many acres in capability classes 6 and 7, which are nonproductive in their present use, should be in 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; *d*, restricted root depth; *s*, sandy texture; 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, d, s, 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 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, 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 or a hardpan 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

Habitat in Ogle County varies greatly. In the intensively farmed cropland, wildlife populations are restricted by lack of suitable cover. Wildlife has greater diversity where pastures and woodlands are interspersed with cropland to provide good habitat, which supports a variety of wildlife species. Soils in the county can be grouped into three major wildlife areas.

Wildlife Area 1. This wildlife area is on the Saybrook-Drummer- Flanagan, Drummer-Selma-Canisteo, Plano-Catlin-Saybrook, Jasper-Varna-Parr, Tama-Ogle-Muscatine, and Fayette-Downs soil associations. Soils are nearly level to strongly sloping and range from well drained to poorly drained.

Wildlife Area 1 is mainly cropland, much of it devoted to continuous row cropping of corn and soybeans. Many of the soils are plowed in the fall. Wildlife habitat is generally poor in quality because of lack of crop residues, herbaceous nesting and roosting cover, woody cover, and travel lanes or hedgerows. Wildlife of this area consists chiefly of ring-necked pheasant, raccoon, and occasional deer, and such nongame species as the horned lark, meadow lark, grasshopper sparrow, fox snake, and others adapted to prairie or open habitats. Practices that would benefit wildlife in this area are delayed mowing of grassy cover in roadsides, ditchbanks, and waterways until after the nesting season, protection of existing woody cover, and crop residue management.

Wildlife Area 2. This wildlife area is on the Pecatonica-Flagg-Westville, Boone-Eleva-Chelsea, and Martinsville-Whalan-Rockton associations. Soils are nearly level to very steep and range from well drained to excessively drained.

Major land uses in this area are cropland, pasture and hayland, and woodland. The diversity of land uses provides habitat for a good variety of wildlife. Major game species are ring-necked pheasant, white-tailed deer, fox and gray squirrels, mourning dove, and rabbit. Other wildlife in this area include bobwhite quail, fox, raccoon, skunk, and other furbearers and nongame birds and mammals. Management practices of greatest benefit to wildlife are protection of woodlands from fire and grazing, pasture management, and crop residue management.

Wildlife Area 3. This wildlife area is on the Lawson-Comfrey-Jasper association located mainly on the flood plain and low terraces bordering the Rock, Kyte, and Leaf Rivers. Soils are nearly level to sloping and range from poorly drained to well drained. Some are subject to flooding.

Major land uses are cropland, pasture, and woodland. Wooded areas provide habitat for white-tailed deer and other woodland wildlife. Poorly drained soils provide wetland habitat for waterfowl, shorebirds, song birds and other aquatic or semi-aquatic species. When flooded, croplands are feeding areas for ducks and geese.

Preservation of existing wetlands and woodlands by protecting them from livestock, crop residue use, and pasture management are measures of greatest value to wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 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 suit-

able 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 barley.

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

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, poplar, cherry, black walnut, apple, hawthorn, dogwood, hickory, blackberry, and sumac. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

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, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, pondweed, cattail, 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 or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include warblers, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and chipmunks.

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 gener-

ally 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 5 feet. For deeper tranches, 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 index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are used in great quantities in many kinds of construction. 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 table 14.

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, if any, are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds.

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 index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 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, and the engineering classifications 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 index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and 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, by runoff from adjacent slopes, or by tides. 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 is 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. 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.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The

kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

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 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 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM).

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 (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*6*). 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."

Ashdale series

This series consists of well drained soils that have moderate permeability in the upper part of the solum and moderately slow or slow permeability in the lower part. These soils formed in 36 to 50 inches of loess and in a thin layer of residuum from limestone bedrock. They formed under prairie vegetation on uplands. Slope ranges from 2 to 10 percent.

Ashdale soils are similar to and are near Catlin, Plano, Rockton, and Tama soils. Catlin, Plano, Rockton, and Tama soils do not have a clay or silty clay IIB horizon, and their solum is not terminated by limestone bedrock.

Typical pedon from an area of Ashdale silt loam, 2 to 5 percent slopes, about 1/2 mile northeast of Monroe Center, 1,525 feet north of center of sec. 22, T. 42 N., R. 2 E.

Ap—0 to 10 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; many roots; compacted as a result of tillage; slightly acid; abrupt smooth boundary.

A3—10 to 17 inches; mixed dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium and fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

B21t—17 to 22 inches; dark brown (10YR 4/3) silty clay loam; weak medium subangular blocky structure parting to moderate very fine and fine subangular blocky; friable; few roots; thin continuous dark brown

(10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—22 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure parting to moderate very fine and fine subangular blocky; friable; few roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B23t—31 to 40 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and patchy light gray (10YR 7/1) uncoated silt grains on faces of peds; very few stone fragments; strongly acid; clear smooth boundary.

B24t—40 to 48 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate very fine and fine prismatic; friable; thick continuous dark brown (10YR 3/3) clay films on faces of peds; few stone fragments; medium acid; abrupt smooth boundary.

IIB3t—48 to 50 inches; mixed brown (7.5YR 5/4) and dark brown (10YR 4/3) clay; moderate coarse prismatic structure; firm; thick continuous dark yellowish brown (10YR 3/4) clay films on faces of peds; neutral; abrupt smooth boundary.

IIR—50 to 52 inches; mixed yellow (10YR 7/6) and brownish yellow (10YR 6/6) disintegrated sandy limestone bedrock; hard level bedded limestone bedrock at a depth of 52 inches; strong effervescence; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness. The residuum commonly is 2 to 12 inches thick. In some pedons, outwash material with higher amounts of sand is at a depth of more than 40 inches and is between the loess and the residuum.

The A horizon has color value of 2 or 3 and chroma of 1 through 3. The part of the B horizon that formed in loess has color value of 4 or 5 and chroma of 3 through 5. Some pedons have a BS horizon. The IIB horizon that formed in residuum of limestone has hue of 5YR, 2.5YR, 7.5YR, or, less commonly, 10YR; value of 3 through 5; and chroma of 3 through 5. In some pedons, hard limestone bedrock is immediately below the residuum.

In map unit 411C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Assumption series

This series consists of moderately well drained soils that have moderate permeability in the upper part of the solum and moderately slow permeability in the lower part. These soils formed in 20 to 40 inches of loess and buried soils. They formed in glacial drift under prairie vegetation. Slope ranges from 2 to 10 percent. In most areas, the surface layer, which ranges from 6 to 9 inches in thickness, is thinner than defined for the series, but this difference does not alter the use or behavior of the soils.

Assumption soils are similar to and are near the Muscatine, Ogle, and Tama soils. Muscatine soils are somewhat poorly drained. Ogle soils have redder hue in the lower part of the solum. Tama soils formed in more than 40 inches of loess and do not have a buried soil in the solum.

Typical pedon from an area of Assumption silt loam, 5 to 10 percent slopes, eroded, formed in loess and a buried soil on uplands, about 1/2 mile southeast of Baileyville, 1,320 feet north and 660 feet east of southwest corner of sec. 4, T. 25 N., R. 8 E.

Ap—0 to 9 inches; very dark gray (10YR 3/1) and some dark yellowish brown (10YR 4/4) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; few roots; layer compacted because of tillage; slightly acid; abrupt smooth boundary.

B21t—9 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very fine and fine subangular blocky structure; friable; few roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—18 to 25 inches; yellowish brown (10YR 5/6) silt loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; strongly acid; abrupt smooth boundary.

IIB23tgb—25 to 30 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium prismatic structure parting to strong medium subangular blocky; firm; few roots; thin discontinuous dark grayish brown (10YR 4/2) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; dark yellowish brown (10YR 4/4) root channel linings; few fine dark accumulations (iron and manganese oxides); strongly acid; abrupt smooth boundary.

IIB24tgb—30 to 36 inches; mixed very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silty clay loam; moderate medium and coarse prismatic structure parting to moderate coarse subangular blocky; firm; few roots; moderate continuous gray (10YR 6/1) clay films on vertical faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB25go—36 to 43 inches; mixed grayish brown (10YR 5/2) and gray (5Y 5/1) clay loam; few fine distinct dark brown (10YR 4/3) mottles; moderate medium and coarse prismatic structure; friable; few roots; many pebbles; strongly acid; clear smooth boundary.

IIB3gb—43 to 63 inches; gray (5Y 5/1) clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; few roots; many pebbles; strongly acid.

The solum ranges from about 4 to 7 feet or more in thickness.

The A horizon ranges from 6 inches to about 9 inches in thickness. It has color value of 2 or 3 and chroma of 1 through 3. The part of the B2 horizon that formed in silty material has color value of 4 or 5 and chroma of 3 through 6. The IIB horizon has hue of 5Y, 2.5Y, or 10YR; value of 3 through 5; and chroma of 1 or 2. Uncoated silt or sand grains are in the IIB horizon when the soil is dry. The B horizon ranges from slightly acid to strongly acid.

Atkinson series

This series consists of well drained soils that have moderate permeability in the upper part of the solum and slow permeability in the lower part. These soils formed in glacial outwash and a thin layer of residuum over limestone bedrock. They formed under prairie vegetation on bedrock uplands. Slope ranges from 2 to 10 percent.

Atkinson soils are similar to and are near the Dickinson, Hitt, Jasper, La Hogue, and Rockton soils. Hitt soils have hue of 5YR or are redder in one or more horizons above the residuum, which is weathered from limestone. The solum of Jasper and La Hogue soils is not terminated by limestone bedrock. In Rockton soils, the solum is terminated by limestone bedrock at a depth of less than 40 inches.

Typical pedon from an area of Atkinson silt loam, 2 to 5 percent slopes, on a bedrock upland plain about 4 miles northeast of Rochelle, 1,330 feet west and 1,285 feet south of northeast corner of sec. 5, T. 40 N., R. 2 E.

Ap—0 to 10 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of tillage; few sand grains; 1 percent pebbles; neutral; abrupt smooth boundary.

A12—10 to 14 inches; mixed very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) silt loam; grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common roots; few sand grains; neutral; clear smooth boundary.

B1—14 to 20 inches; brown (10YR 4/3) silt loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; few sand grains; few very dark brown (10YR 2/2) worm channel fillings; some pebbles at a depth of about 20 inches; slightly acid; clear smooth boundary.

B21t—20 to 30 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; few pebbles; slightly acid; clear smooth boundary.

B22t—30 to 36 inches; dark brown (7.5YR 4/4) loam; moderate fine and medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; several large pebbles more than 1 inch in diameter; 6 percent pebbles; stone line at a depth of about 33 inches; slightly acid; clear smooth boundary.

B23t—36 to 39 inches; dark brown (7.5YR 4/4) sandy clay loam; strong medium prismatic structure; firm; few roots; moderate discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; 1 percent pebbles; slightly acid; abrupt smooth boundary.

IIB24t—39 to 43 inches; dark brown (7.5YR 4/4) silty clay; strong medium prismatic structure; firm; few roots; thick continuous dark brown (7.5YR 3/2) clay films on faces of peds; neutral; abrupt smooth boundary.

IIR—43 inches; yellow (10YR 7/6) limestone bedrock.

The solum typically is 40 to 45 inches thick but ranges to about 55 inches in some pedons. Free carbonates are absent above the limestone bedrock. A stone line generally is in the B1 horizon or the upper part of the B2 horizon. The solum is medium acid or slightly acid in the most acid part.

The A1 horizon is 8 to 14 inches thick; color value is 2 or 3 and chroma is 1 or 2. This horizon is either loam or silt loam and has moderate amounts of sand. The B2 horizon typically has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 or 5. The IIB horizon has hue of 7.5YR, 5YR, or 10YR; value of 4 through 6; and chroma of 3 through 8.

In map unit 661C2 the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Atterberry series

This series consists of somewhat poorly drained soils that have moderate permeability or moderately slow permeability. These soils formed in loess under mixed prairie and forest vegetation on uplands. Slope ranges from 0 to 3 percent.

Atterberry soils are similar to Muscatine and Stronghurst soils and are near the Assumption, Downs, Fayette, Ogle, and Tama soils. Muscatine soils have a thicker mollic surface layer and do not have an A2 horizon. Stronghurst soils do not have a mollic surface layer. Assumption Downs, Fayette, Ogle, and Tama soils have better natural drainage. In addition, Assumption and Ogle soils formed in loess and glacial till.

Typical pedon from an area of Atterberry silt loam on an upland flat about 1/2 mile west and 1/2 mile south of Baileyville, 1,403 feet east and 733 feet north of southwest corner of sec. 5, T. 25 N., R. 8 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) mixed with some dark brown (10YR 3/3) silt loam, gray (10YR 5/1) dry; moderate very fine and fine granular struc-

ture; friable; common roots; layer compacted because of tillage; medium acid; abrupt smooth boundary.

A2—6 to 13 inches; dark grayish brown (10YR 4/2) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak thin platy structure parting to moderate fine granular; friable; common roots; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B1t—13 to 19 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak thin platy structure parting to moderate fine granular; friable; common roots; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

B21t—19 to 25 inches; olive (5Y 5/3) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; friable; few roots; thin continuous grayish brown (2.5Y 5/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B22t—25 to 33 inches; olive (5Y 5/3) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B23t—33 to 42 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse prismatic structure; friable; few roots; thin continuous grayish brown (2.5Y 5/2) clay films on vertical faces of peds; many fine and medium dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B3t—42 to 49 inches; mottled light olive gray (5Y 6/2), olive (5Y 5/3), and yellowish brown (10YR 5/4) silty clay loam; weak coarse prismatic structure; friable; few roots; thin continuous olive gray (5Y 5/2) clay films on vertical faces of peds; few very dark gray (5Y 3/1) root channel linings; many medium dark concretions (iron and manganese oxides); neutral; gradual smooth boundary.

C—49 to 60 inches; mottled yellowish brown (10YR 5/6), grayish brown (2.5YR 5/2), light olive brown (2.5Y 5/4), and olive (5Y 5/3) silt loam; massive; friable; some vertical cleavage in upper part of horizon; few very dark gray (10YR 3/1) root channel linings; many medium dark concretions (iron and manganese oxides); mildly alkaline.

The solum ranges from 3.5 to 5 feet or more in thickness.

The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR, 2.5Y, or 5Y; value of 4 through 6; and chroma of 2 through 4.

Batavia series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in 40 to 55 inches of loess over stratified outwash. They formed under prairie grasses and trees on outwash plains and stream terraces. Slope ranges from 1 to 5 percent.

Batavia soils are similar to Plano soils and are near the Elburn, Kendall, Martinsville, and St. Charles soils. Plano soils have a mollic surface layer. Elburn and Kendall soils are somewhat poorly drained. Martinsville soils are fine and loamy. St. Charles soils have a thinner or lighter colored Ap horizon and a more prominent A2 horizon.

Typical pedon from an area of Batavia silt loam, 1 to 5 percent slopes, on a loess covered outwash plain about 1 1/2 miles southeast of Lindenwood, 1,364 feet west and 1,073 feet south of northeast corner of sec. 9, T. 41 N., R. 2 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 3/3) crushed, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; common roots; a small amount of light colored deposition is mixed into horizon; medium acid; abrupt smooth boundary.

A2—7 to 11 inches; dark grayish brown (10YR 4/2) and very dark grayish brown (10YR 3/2) silt loam, dark brown (10YR 4/3) crushed; moderate thin and medium platy structure parting to moderate fine granular; friable; common roots; light gray (10YR 7/1) uncoated silt grains on faces of peds; slightly acid; clear smooth boundary.

B1t—11 to 16 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; few roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B21t—16 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—22 to 33 inches; dark brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; gradual smooth boundary.

B31t—33 to 46 inches; dark brown (10YR 4/3) silty clay loam; moderate medium and coarse prismatic structure; friable; few roots; thin discontinuous dark

brown (10YR 3/3) clay films on vertical faces of peds; strongly acid; abrupt smooth boundary.

IIB32t—46 to 52 inches; dark yellowish brown (10YR 4/4) stratified loam, clay loam, and silt loam; weak coarse prismatic structure; friable; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; strongly acid.

IIC—52 to 60 inches; dark grayish brown (10YR 4/4) stratified loam, clay loam, and silt loam; massive; friable; medium acid.

The solum ranges from 42 inches to about 70 inches in thickness.

The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 through 3. The A2 horizon, where present, typically has color value of 4 through 6 and chroma of 2 or 3. The B horizon has color value of 4 or 5 and chroma of 3 through 6. Mottles are in the lower part of some pedons. The IIB horizon is sandy loam, silt loam, sandy clay loam, clay loam, or loam.

Birkbeck series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in a loess or silt mantle 40 to 60 inches thick and in the underlying loamy glacial till. They formed under forest vegetation on till plains. Slope ranges from 2 to 10 percent.

Birkbeck soils are similar to and are near Dodge, Fayette, Rozetta, and St. Charles soils. St. Charles soils have more sand in the lower part of the solum and have a C horizon in stratiied outwash. Dodge soils have a thinner solum above the glacial till. Fayette and Rozetta soils have less sand in the lower part of the B horizon and have a C horizon of loess.

Typical pedon from an area of Birkbeck silt loam, 2 to 5 percent slopes, on an upland till plain about 1 1/2 miles north and 1 mile west of White Rock, 2,120 feet south and 570 feet west of northeast corner of sec. 6, T. 41 N., R. 1 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; moderate very fine and fine granular structure; friable; many roots; medium acid; clear smooth boundary.

A21—4 to 8 inches; brown (10YR 5/3) silt loam; weak thin and medium platy structure; friable; common roots; strongly acid; clear smooth boundary.

A22—8 to 11 inches; dark brown (10YR 4/3) with some brown (10YR 5/3) silt loam; weak medium and thick platy structure; friable; common roots; strongly acid; clear smooth boundary.

B21t—11 to 18 inches; dark brown (10YR 4/3) silty clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin discontinuous dark grayish brown (10YR 4/2) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B22t—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

B23t—24 to 31 inches; dark brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6 & 5/8) mottles; weak medium and coarse prismatic structure; friable; few roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); few root channel fillings present; strongly acid; clear smooth boundary.

B24t—31 to 39 inches; mottled yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (5/6 & 5/8) mottles; weak coarse prismatic structure; friable; few roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); few root channel fillings; medium acid; clear smooth boundary.

B31t—39 to 44 inches; mottled yellowish brown (10YR 5/4) and grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6 & 5/8) mottles; weak coarse prismatic structure; friable; few roots; thin patchy dark grayish brown (10YR 4/2) clay films on faces of peds; common dark fine concretions (iron and manganese oxides); few pebbles; mildly alkaline; clear smooth boundary.

IIB32—44 to 48 inches; yellowish brown (10YR 5/4) loam; many medium distinct yellowish brown (10YR 5/6 & 5/8) and few coarse distinct grayish brown (10YR 5/2) mottles; weak coarse prismatic structure; friable; few fine dark concretions (iron and manganese oxides); few pebbles; mildly alkaline; clear smooth boundary.

IIC—48 to 60 inches; yellowish brown (10YR 5/4) loam; weak coarse prismatic structure; friable; definite till structure; few pebbles; few root channel fillings; strong effervescence; moderately alkaline.

The solum ranges from 44 to 65 inches or more in thickness.

The A l horizon typically has color value of 3 or 4. The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. Faint to prominent mottles are in the middle and lower pat of the B2 horizon. This horizon ranges from strongly acid to slightly acid. The IIC horizon is commonly loam but is silt loam, clay loam, or silty clay loam in places.

Boone series

This series consists of excessively drained soils that have rapid permeability. These soils formed in fine, medium, or coarse sand residuum weathered from sandstone bedrock. They formed under forest vegetation on ridgetops and valley slopes. Slope ranges from 2 to 45 percent.

Boone soils are near Chelsea and Eleva soils. Eleva soils have a sandy loam solum. Chelsea soils do not have cemented sandstone.

Typical pedon from an area of Boone sand, 7 to 15 percent slopes, on an upland ridge about 2 miles west and 4 miles south of Oregon in Lowden Boy Scout Camp, 937 feet west and 326 feet north of center of sec. 29, T. 23 N., R. 10 E.

A1—0 to 2 inches; mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) sand, pale brown (10YR 6/3) dry; weak very fine granular structure; very friable; common roots; white (10YR 8/2) uncoated sand grains on faces of peds; small amount of organic matter; slightly acid; abrupt smooth boundary.

C1—2 to 9 inches; yellowish brown (10YR 5/4) sand; single grained; loose; few roots; strongly acid; clear smooth boundary.

C2—9 to 34 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; few roots; many 1/2-inch to 6-inch sandstone fragments; strongly acid; diffuse smooth boundary.

Cr—34 to 60 inches; light yellowish brown (10YR 6/4) sand; weakly cemented sandstone; strongly acid.

Sandstone bedrock is at a depth of 20 to 40 inches.

The A1 horizon typically has color value of 3 through 5 and chroma of 1 through 3. The Ap horizon, where present, commonly has color value of 4 through 6. The surface soil generally is sand but is loamy sand or loamy fine sand in places. The C horizon has hue of 10YR or 7.5YR, value of 4 through 8, and chroma of 1 through 6. The sand ranges from fine through coarse.

Canisteo series

This series consists of poorly drained soils that have moderate permeability. These soils formed in calcareous glacial drift under prairie grasses and sedges on outwash plains. Slope ranges from 0 to 3 percent.

Canisteo soils are similar to Selma soils and are near Drummer, Elburn, La Hogue, and Selma soils. All these soils lack carbonates in the upper part of the solum.

Typical pedon from an area of Canisteo clay loam on an outwash plain about 4 miles southwest of Flagg Center, 1,336 feet east and 200 feet north of southwest corner of sec. 15, T. 22 N., R. 11 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) clay loam, gray (10YR 5/1) dry; moderate very fine and fine granular structure; friable; few roots; layer compacted because of tillage; strong effervescence; moderately alkaline; abrupt smooth boundary.

A†2—7 to 19 inches; very dark gray (10YR 3/1) clay loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few roots; strong effervescence; moderately alkaline; clear smooth boundary.

B1g—19 to 26 inches; olive gray (5Y 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak very fine and fine subangular blocky structure; friable; few roots; thin continuous very dark gray (5Y 3/1) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); sand grains and pebbles present; slight effervescence; moderately alkaline; clear smooth boundary.

B2g—26 to 40 inches; olive gray (5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky, weak structure in lower 5 inches; friable; few roots; few fine dark accumulations (iron and manganese oxides); slight effervescence; mildly alkaline; clear smooth boundary.

Cg—40 to 62 inches; mixed olive gray (5Y 5/2) and yellowish brown (10YR 5/6) loam; massive; firm; few roots; few coarse lime accumulations; gray (5Y 5/1) sandy loam band at a depth of 52 to 54 inches; few pebbles; krotovina at a depth of 48 to 49 inches; slight effervescence; moderately alkaline.

The solum ranges from 20 to 40 inches in thickness. The upper 20 to 30 inches of the solum does not have coarse fragments in some pedons. Typically, the solum has a calcium carbonate equivalent of about 5 to 20 percent.

The A horizon ranges from 14 to 24 inches in thickness. It has a hue of 10YR or neutral, value of 2 or 3, and chroma of 1 or less. The more calcareous A horizons have dry values of 4 or 5. These horizons typically are clay loam, but they range to loam, silty clay loam, and silt loam. The B horizon generally has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 1 or 2, but in some pedons hue is 10YR. These horizons typically are clay loam or silty clay loam but are loam and silt loam in places.

Catlin series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess or silty material. They formed under prairie vegetation in glacial till or lakebed sediment. Slope ranges from 0 to 10 percent.

Catlin soils are similar to Plano and Tama soils and are near Downs, Ogle, and Sidell soils. Plano soils have more sand in the lower part of the solum, and the C horizon is loamy outwash. Tama soils have a C horizon of noncalcareous loess. Downs soils have a thinner

mollic surface layer. Ogle soils have a buried soil that has hue of 5YR at a depth of more than 30 inches. Sidell soils contain more sand in the lower part of the 40-inch control section, and the silty mantle is commonly less than 40 inches thick.

Typical pedon from an area of Catlin silt loam, 0 to 2 percent slopes, on a loess covered glacial till plain about 1 1/2 miles south and 2 1/2 miles east of Monroe Center, 571 feet east and 650 feet south of northwest corner of sec. 36, T. 42 N., R. 2 E.

Ap—0 to 11 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; many roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

B1t—11 to 18 inches; dark brown (10YR 4/3) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin discontinuous dark brown (10YR 3/3) clay films and patchy light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B21t—18 to 23 inches; brown (10YR 5/3) silty clay loam; moderate medium prismatic structure parting to strong fine and medium subangular blocky; friable; common roots; moderate continuous dark brown (10YR 4/3 & 3/3) clay films and patchy light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B22t—23 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; few fine prominent dark brown (7.5YR 4/4) and common fine faint yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to strong medium subangular blocky; firm; few roots; moderate continuous dark brown (10YR 4/3) clay films and patchy light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark concretions (iron and manganese oxides); few very dark brown (10YR 2/2) root channel linings; medium acid; clear smooth boundary.

B23t—31 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; few fine prominent dark brown (7.5YR 4/4) and common fine distinct yellowish brown (10YR 5/6) mottles; strong medium prismatic structure parting to strong medium and coarse subangular blocky; firm; few roots; moderate discontinuous grayish brown (2.5Y 5/2) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B24t—36 to 44 inches; mixed yellowish brown (10YR 5/6), dark brown (7.5YR 4/4), and light brownish gray (2.5Y 6/2) silty clay loam; weak coarse subangular blocky structure; firm; few roots; moderate discontinuous grayish brown (2.5Y 5/2) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark concretions (iron and manganese oxides); few very dark brown (10YR 2/2) root channel linings; slightly acid; abrupt smooth boundary.

IIB3t—44 to 49 inches; dark yellowish brown (10YR 4/4) clay loam; weak coarse subangular blocky structure; firm; few roots; thick discontinuous very dark brown (10YR 2/2) and brown (10YR 5/3) clay films on vertical faces of peds; few very dark brown (10YR 2/2) root channel linings; neutral; clear smooth boundary.

IIC—49 to 60 inches; yellowish brown (10YR 5/4) loam; common fine faint yellowish brown (10YR 5/6) mottles; massive; firm; few roots; few very dark brown (10YR 2/2) root channel linings; strong effervescence; moderately alkaline.

The solum is typically 45 to 55 inches thick, but in some pedons it is 65 inches thick or more. It commonly extends 4 to 12 inches into the glacial till or lakebed sediment. Reaction generally is medium acid in the upper part of the solum and grades to neutral in the lower part. In some pedons, the soil is slightly acid or neutral throughout.

The A horizon has color value of 2 or 3 and chroma of 1 through 3. The B horizon generally has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 through 6, except that in some pedons the lower part has hue of 7.5YR and is mottled. The IIB horizon is silt loam, loam, clay loam, or light silty clay loam that is high in content of sand. It formed in till or lacustrine deposit. The IIC horizon is loam, silt loam, clay loam, or silty clay loam.

In mapping unit 171C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Chelsea series

This series consists of excessively drained soils that have rapid permeability. These soils formed in wind-worked sands under forest vegetation on ridgetops and side slopes. Slope ranges from 1 to 15 percent. These soils have a smaller increase in clay between the A and B parts of the A&B horizon than is defined as the range for the series. This difference does not alter the use or behavior of the soils.

Chelsea soils are near Boone and Eleva soils. Boone and Eleva soils have sandstone within a depth of 60 inches.

Typical pedon from an area of Chelsea loamy sand, 7 to 15 percent slopes, on an upland sand dune about 2 miles south of Oregon, 1,524 feet north and 978 feet west of southeast corner of sec. 20, T. 23 N., R. 10 E.

A1—0 to 3 inches; very dark brown (10YR 2/2) loamy sand, grayish brown (10YR 5/2) dry; moderate very fine granular structure; very friable; common roots; medium acid; clear smooth boundary.

A21—3 to 6 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) sand; weak

medium subangular blocky structure parting to moderate very fine granular; very friable; common roots; thin discontinuous dark brown (10YR 3/3) clay and organic films on faces of peds; medium acid; clear smooth boundary.

A22—6 to 11 inches; yellowish brown (10YR 5/4) sand; very weak medium and coarse subangular blocky structure parting to single grained; loose; common roots; medium acid; clear smooth boundary.

A23—11 to 22 inches; yellowish brown (10YR 5/4) sand; very weak medium and coarse subangular blocky structure parting to single grained; loose; few roots; medium acid; clear smooth boundary.

A24—22 to 32 inches; yellowish brown (10YR 5/4) sand; very weak coarse prismatic structure parting to single grained; loose; medium acid; gradual smooth boundary.

A25—32 to 38 inches; yellowish brown (10YR 5/6) sand; very weak coarse prismatic structure parting to single grained; loose; few very fine bands of brown (7.5YR 4/4) sand grains; medium acid; gradual smooth boundary.

A&B—38 to 60 inches; brownish yellow (10YR 6/6) sand (A2); single grained; loose; some brown (7.5YR 4/4) and strong brown (7.5YR 5/6) thin bands of loamy sand (B2t); 6 percent pebbles in lower part; medium acid.

The solum ranges from 4 feet to many feet in thickness.

The A1 or Ap horizon ranges in color value from 2 through 4 and in chroma from 1 through 3. The upper part of the A2 horizon has color value of 5 or 4 and chroma of 2 through 4, and the lower part has color value of 4 through 6 and chroma or 4 through 6. In the

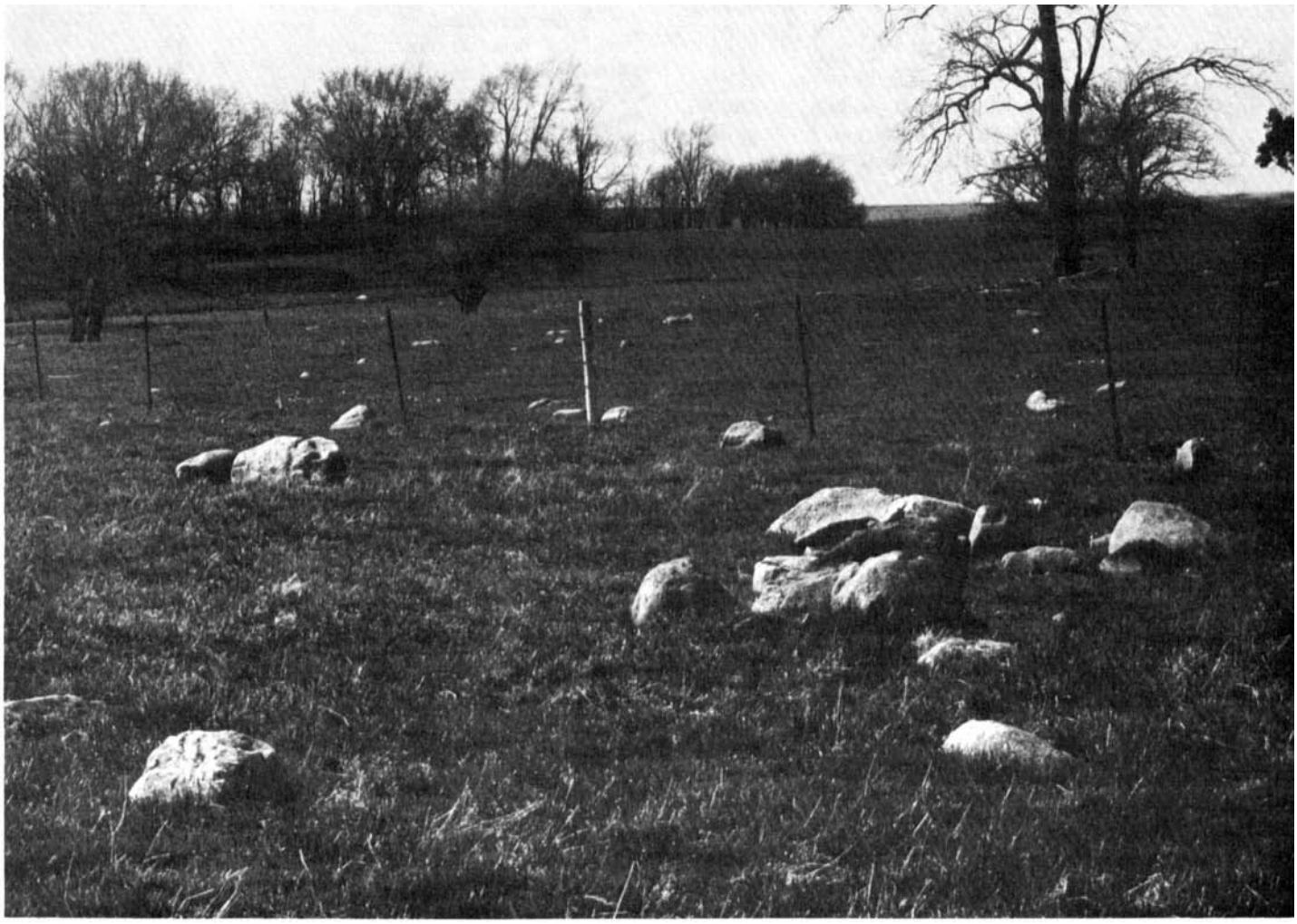

Figure 10.—Boulder strewn field of Comfrey clay loam.

A&B horizon, the B part is lamellae 1/2 to 2 inches thick that have hue of 7.5YR or 10YR, value and chroma commonly of 3 or 4, and texture of light sandy loam or loamy sand. The depth to the uppermost bands commonly is 36 inches and ranges from 27 to 48 inches.

Comfrey series

This series consists of poorly drained soils that have moderate permeability. These soils formed in alluvial sediment under prairie vegetation and trees on outwash plains and river bottoms (fig. 10). Slope ranges from 0 to 3 percent. The depth to free carbonates is deeper than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Comfrey soils are similar to Sawmill soils and are near Drummer, Lawson, Millington, and Selma soils. Sawmill soils have less sand in the solum. Drummer and Selma soils do not have a cumulic surface layer. Millington soils are calcareous throughout the solum. Lawson soils have better natural drainage.

Typical pedon from an area of Comfrey clay loam on the Rock River flood plain, about 1 mile east of Byron, 1,815 feet north and 990 feet east of southwest corner of sec. 33, T. 23 N., R. 11 E.

Ap—0 to 7 inches; black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; moderate very fine and fine granular structure; friable; few roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A12—7 to 13 inches; black (10YR 2/1) clay loam, dark gray (10YR 4/1) dry; moderate fine and medium subangular blocky structure; friable; few roots; mildly alkaline; clear smooth boundary.

A13—13 to 27 inches; black (10YR 2/1) clay loam; dark gray (10YR 4/1) dry; moderate very fine and fine subangular blocky structure; friable; few roots; mildly alkaline; clear smooth boundary.

A14—27 to 35 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; few fine faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; mildly alkaline; clear smooth boundary.

C1g—35 to 48 inches; mottled dark gray (10YR 4/1) and very dark gray (10YR 3/1) loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium and coarse prismatic structure parting to moderate fine prismatic; friable; few roots; few fine dark concretions (iron and manganese oxides); mildly alkaline; gradual smooth boundary.

C2—48 to 60 inches; mottled dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; friable; few roots; mildly alkaline.

The A horizon ranges from 24 to 36 inches in thickness. The depth to free carbonates is more than 48 inches in most pedons.

The A horizon typically has hue of 10YR or is neutral, and it has chroma of 1 or less. It typically is clay loam or loam, but subhorizons in some pedons are silty clay loam or silt loam that is high in content of sand. The C horizon is typically loam or clay loam, but it ranges from silt loam or silty clay loam that is high in content of sand to stratified loam, sandy loam, loamy sand, and sand.

Dickinson series

This series consists of well drained soils that have moderately rapid permeability in the upper part of the solum and rapid permeability in the lower part. These soils formed in moderately coarse textured glacial drift or outwash and alluvial sediment reworked by wind. They formed under prairie vegetation on uplands and terraces. Slope ranges from 1 to 12 percent.

Dickinson soils are similar to Lamont soils and are near the Jasper, La Hogue, Sparta, and Warsaw soils. Lamont soils do not have a mollic surface layer. Jasper and Warsaw soils have more clay in the solum. In addition, Warsaw soils are over sand and gravel. La Hogue soils are somewhat poorly drained. Sparta soils are coarser textured.

Typical pedon from an area of Dickinson sandy loam, 1 to 5 percent slopes, on an outwash terrace about 1 1/2 miles north and 1/2 miles east of Byron along Illinois Route 2, 1,875 feet east and 490 feet south of center of sec. 20, T. 25 N., R. 11 E.

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common roots; layer compacted because of tillage; strongly acid; clear smooth boundary.

A3—8 to 12 inches; mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) sandy loam, brown (10YR 5/3) dry; weak fine and medium subangular blocky structure parting to weak fine granular; friable; common roots; slightly acid; clear smooth boundary.

B21t—12 to 23 inches; dark brown (10YR 4/3) sandy loam; weak coarse subangular blocky structure parting to weak very fine subangular blocky; friable; common roots; thin continuous dark brown (10YR 3/3) clay and organic films on faces of peds; strongly acid; clear smooth boundary.

B22t—23 to 32 inches; dark brown (10YR 4/3) loamy sand; weak coarse prismatic structure parting to weak fine and medium subangular blocky; very friable; common roots; thin discontinuous dark brown (10YR 3/3) clay and organic films on faces of peds; medium acid; clear smooth boundary.

B3t—32 to 46 inches; dark yellowish brown (10YR 4/4) loamy sand; weak to very weak fine and medium

subangular blocky structure; very friable; few roots; thin discontinuous dark brown (10YR 3/3) clay and organic films on faces of peds; few pebbles in lower part; slightly acid; clear smooth boundary.

C11—46 to 54 inches; yellowish brown (10YR 5/6) sand; single grained; loose; few pebbles; few faint bands; slightly acid; clear smooth boundary.

C12—54 to 60 inches; mixed yellowish brown (10YR 5/4 and 5/6) sand; single grained; loose; dark yellowish brown (10YR 3/4) bands; few pebbles; strongly acid.

The solum ranges from 24 to 50 inches in thickness. Loamy sand and sand are typically between depths of 20 and 36 inches, but they range to a depth of as much as 42 inches.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. It is fine sandy loam, sandy loam, or loam. The B2 horizon has hue of 10YR or 7.5YR. The upper part of this horizon has value of 3 or 4 and chroma of 2 or 3, and the lower part grades to higher value and chroma. The C horizon is loamy fine sand, loamy sand, fine sand, or sand.

Dodge series

This series consists of well drained soils that have moderate permeability. These soils formed in loess and glacial till under forest vegetation on till plains. Slope ranges from 2 to 10 percent.

Dodge soils are similar to Birkbeck, Saybrook, and St. Charles soils and are near Birkbeck, Flanagan, Miami, and St. Charles soils. Saybrook soils have a mollic surface layer. Birkbeck and St. Charles soils have thicker loess over glacial drift. Flanagan soils have poorer natural drainage. Miami soils have a fine loamy solum.

Typical pedon from an area of Dodge silt loam, 2 to 5 percent slopes, on a loess covered till plain about 2 miles northwest of White Rock, 980 feet west and 2,980 feet south of northeast corner of sec. 6, T. 41 E., R. 1 E.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine and medium structure; friable; many roots; neutral; clear smooth boundary.

A2—4 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak thin and medium platy structure; friable; common roots; light gray (10YR 7/2) uncoated silt grains; structure weakens in lower part; medium acid; clear smooth boundary.

B1t—11 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure parting to moderate fine subangular blocky; friable; common roots; thin patchy dark brown (10YR 4/3) clay films and light gray (10YR 7/2) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B21t—16 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to strong fine subangular blocky; firm; common roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—25 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure; firm; few roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; few sand grains; medium acid; clear smooth boundary.

IIB3—29 to 33 inches; yellowish brown (10YR 5/4) clay loam; weak medium and coarse prismatic structure; friable; few roots; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; some pebbles; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

IIC—33 to 60 inches; light yellowish brown (10YR 6/4) loam; massive, some very weak prismatic structure in upper 8 inches; firm; some pebbles; few fine dark accumulations (iron and manganese oxides); violent effervescence; moderately alkaline.

The solum is typically 30 to 40 inches thick. The loess is 24 to 36 inches thick.

The A horizon has color value of 4 or 5 and chroma of 2 through 4. The B2t horizon has color value of 4 or 5 and chroma of 4 through 6. The IIB2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. It commonly is 1 to 10 percent pebbles. The B horizon ranges from slightly acid to strongly acid.

Downs series

This series consists of well drained soils that have moderate permeability. These soils formed in loess under prairie vegetation with scattered trees on ridgetops. Slope ranges from 0 to 5 percent.

Downs soils are similar to the Fayette and Tama soils and are near the Atterberry, Rozetta, and Stronghurst soils. Fayette soils do not have a mollic surface layer. Tama soils have a thicker mollic surface layer and do not have an A2 horizon. Atterberry and Stronghurst soils have poorer natural drainage. Rozetta soils have a light colored surface layer and mottles with chroma of 2 at a depth of less than 30 inches.

Typical pedon from an area of Downs silt loam, 2 to 5 percent slopes, on loess covered uplands about 3 1/2 miles west and 1 mile south of Mt. Morris, 1,374 feet west and 1,242 feet north of southeast corner of sec. 36, T. 24 N., R. 8 E.

Ap—0 to 7 inches; mixed very dark gray (10YR 3/1) and dark brown (10YR 4/3) silt loam, grayish brown (10YR 5/2) dry; moderate medium and fine granular structure; friable; common roots; layer compacted because of tillage; few gray (10YR 6/1) uncoated silt grains on faces of peds; neutral; abrupt smooth boundary.

B1—7 to 12 inches; dark brown (10YR 4/3) mixed with some very dark gray (10YR 3/1) silty clay loam; weak fine and medium subangular blocky structure; friable; common roots; medium acid; clear smooth boundary.

B21t—12 to 17 inches; dark brown (10YR 4/3) mixed with some very dark gray (10YR 3/1) silty clay loam; moderate medium subangular blocky structure parting to moderate very fine and fine subangular blocky; friable; few roots; medium acid; clear smooth boundary.

B22t—17 to 24 inches; dark brown (10YR 4/3) silty clay loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous very dark grayish brown (10YR 3/2) and thin patchy very dark gray (10YR 3/1) clay films on faces of peds; medium acid; clear smooth boundary.

B23t—24 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few very dark gray (10YR 3/1) root channel fillings; strongly acid; gradual smooth boundary.

B24t—32 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; friable; few roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; gradual smooth boundary.

B31t—38 to 47 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4) silty clay loam; moderate coarse prismatic structure; friable; few roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; gradual smooth boundary.

B32—47 to 60 inches; mixed yellowish brown (10YR 5/4 & 5/6) silt loam; weak coarse prismatic structure; friable; light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid.

The solum ranges from 42 inches to more than 60 inches in thickness.

The A1 or Ap horizon typically is 6 to 9 inches thick and has color value of 2 or 3 and chroma of 1 or 2. The A2 horizon is mixed with the Ap horizon in many pedons. The B horizon has value of 4 or 5 and chroma of 3 through 6.

Drummer series

This series consists of poorly drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess or waterlaid silty material and underlying stratified outwash and glacial till. They formed under marsh grass and sedge vegetation. Slope ranges from 0 to 3 percent.

Drummer soils are similar to Sable and Selma soils and are near Elburn, Canisteo, and Sawmill soils. Sable soils have less sand in the lower part of the B horizon and in the C horizon. Selma soils have more sand in the upper part of the solum. Canisteo soils have a calcareous solum. Elburn soils have better natural drainage. Sawmill soils have a mollic surface layer that is more than 24 inches thick.

Typical pedon from an area of Drummer silty clay loam on an outwash plain about 1 1/2 miles south and 2 1/2 miles east of Lindenwood, 2,605 feet west and 65 feet south of northeast corner of sec. 14, T. 41 N., R. 2 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common roots; layer compacted because of tillage; a few sand grains present; neutral; abrupt smooth boundary.

A12—8 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; few roots; neutral; clear smooth boundary.

B1g—12 to 18 inches; dark gray (10YR 4/1) silty clay loam; few fine faint very dark grayish brown (10YR 3/2) mottles; weak fine and medium subangular blocky structure; friable; few roots; few fine dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

B21g—18 to 26 inches; olive gray (5Y 5/2) silty clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; few roots; common fine dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

B22g—26 to 34 inches; olive gray (5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable; few fine dark accumulations (iron and manganese oxides); black krotovina; neutral; clear smooth boundary.

B23g—34 to 41 inches; olive gray (5Y 5/2) silty clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium and coarse subangular blocky; friable; few fine dark accumulations (iron and manganese oxides); mildly alkaline; clear smooth boundary.

IIB3g—41 to 47 inches; olive gray (5Y 5/2) silt loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; few fine dark accumulations (iron and manganese oxides); many sand grains; mildly alkaline; abrupt smooth boundary.

IICg—47 to 60 inches; mottled olive gray (5Y 5/2) and yellowish brown (10YR 5/6) stratified loam and silt loam; massive; friable; mildly alkaline.

The solum is commonly 44 to 50 inches thick, but in some pedons, it is as much as 60 inches thick or more.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The Bg horizon has hue of mainly 5Y or 2.5Y and less commonly 10YR, value of 4 or more, and chroma of 2 or less. Mottles are of higher value and chroma. The Bg horizon typically is silty clay loam in the upper part and grades to silt loam, loam, or clay loam in the lower part. The C horizon is commonly stratified silt loam, loam, sandy loam, clay loam, silty clay loam, and a few gravelly loam layers.

Dubuque series

This series consists of moderately deep, well drained soils that have moderate permeability in the upper part of the solum and slow permeability in the lower part. These soils formed in 18 to 36 inches of loess and a thin layer of residual material weathered from limestone or dolomite bedrock. They formed under forest vegetation on uplands. Slope ranges from 7 to 15 percent.

Dubuque soils are near Fayette, Miami, Palsgrove, Sogn, and Whalan soils. All these soils except Sogn and Whalan soils do not have bedrock within 40 inches of the surface and are near the ridgetop on the landscape. Sogn soils are shallower to bedrock and have a mollic surface layer. Whalan soils have more sand in the solum above the bedrock.

Typical pedon from an area of Dubuque silt loam, 7 to 15 percent slopes, eroded, on a side slope about 1 mile north and 1 mile east of Adeline, 966 feet south and 489 feet east of northwest corner of sec. 21, T. 25 N., R. 9 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) mixed with some dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; common roots; layer compacted because of agricultural practices; slightly acid; abrupt smooth boundary.

B21t—6 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine and medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and some dry uncoated grains on faces of peds; few chert pebbles present; medium acid; clear smooth boundary.

B22t—16 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin continuous dark yellowish brown (10YR 4/4) and thick patchy reddish brown (5YR 4/4) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B23t—24 to 27 inches; mixed yellowish brown (10YR 5/4) and reddish brown (5YR 4/4) silty clay loam; moderate medium and coarse prismatic structure; firm; few roots; thin discontinuous dark reddish brown (5YR 3/4) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); stone line at top of horizon; medium acid; clear smooth boundary.

IIB24t—27 to 32 inches; reddish brown (5YR 4/4) clay; weak coarse prismatic structure; firm; few roots; thick continuous dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; abrupt smooth boundary.

IIR—32 to 35 inches; very pale brown (10YR 7/3) fragmented dolomite over hard bedded dolomite; some dolomitic fragments are easily separated and have small amounts of reddish clayey material between them; strong effervescence; moderately alkaline.

The thickness of the solum and depth to limestone bedrock range from 20 to 40 inches.

The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. The B2t horizon is silt loam or silty clay loam. The upper part of the B2t horizon has color value of 4 or 5 and chroma of 3 through 6. The IIB2 horizon consists of a thin silty clay or clay layer commonly containing some chert or limestone fragments. It typically has hue of 5YR, 7.5YR, or 10YR; value of 4 or higher; and chroma of 3 or higher.

Dunbarton series

This series consists of well drained soils that have moderately slow permeability. These soils formed in a thin loess mantle and clayey residuum over limestone or dolomite bedrock. They formed under forest vegetation on bedrock uplands. Slope ranges from 5 to 20 percent.

Dunbarton soils are near Dubuque, Palsgrove, Sogn, and Whalan soils. Dubuque, Palsgrove, and Whalan soils are deeper to bedrock and have less clay in the solum. Sogn soils do not have residuum above the bedrock and have a darker colored surface layer.

Typical pedon from an area of Dunbarton silty clay loam, 12 to 20 percent slopes, eroded, on a bedrock side slope about 1 3/4 miles northeast of Adeline, 2,392 feet east and 230 feet north of southwest corner of sec. 16, T. 25 N., R. 9 E.

Ap—0 to 5 inches; mixed brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silty clay loam, pale brown (10YR 6/3) dry; moderate fine and medium granular structure; friable; many roots; 2 percent pebbles; neutral; abrupt smooth boundary.

B21t—5 to 10 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; 2 percent pebbles; slightly acid; clear smooth boundary.

IIB22t—10 to 16 inches; brown (7.5YR 4/4) clay; strong medium and coarse subangular blocky structure;

firm; common roots; thin patchy brown (10YR 4/3) clay films on faces of peds; 10 percent pebbles; few fine dark iron and managanese stains; medium acid; abrupt smooth boundary.

IIR—16 inches; dolomite bedrock.

The thickness of the solum and depth to hard rock range from 12 to 20 inches. The loess mantle generally is 8 to 10 inches thick but ranges from none to a maximum of about 18 inches. Coarse fragments, mainly chert, range from 0 to 20 percent, by volume.

The Ap horizon has color value of 4 or 5 and chroma of 2 through 4. The B2t has color value of 4 or 5 and chroma of 3 or 4. The IIB2t horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 or 5; and chroma of 3 through 6. It typically is clay loam, silty clay, or clay, but it ranges to silty clay loam in one of the subhorizons.

Du Page series

This series consists of well drained soils that have moderate permeability. These soils formed in alluvium under prairie vegetation on flood plains. Slope ranges from 0 to 3 percent.

Du Page soils are near Comfrey, Lawson, and Millington soils. Comfrey, Lawson, and Millington soils have poorer natural drainage.

Typical pedon from an area of Du Page silt loam, on a river bottom flood plain about 2 miles south of Oregon, 897 feet south and 490 feet west of northeast corner of sec. 21, T. 23 N., R. 10 E.

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common roots; some visible sand grains; slight effervescence; moderately alkaline; abrupt smooth boundary.

A12—7 to 17 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate coarse granular structure parting to moderate fine and medium granular; friable; few roots; some visible sand grains; slight effervescence; moderately alkaline; clear smooth boundary.

A13—17 to 24 inches; mixed very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; moderate very fine and fine subangular blocky structure; friable; few roots; layer of snail shells at bottom of horizon; slight effervescence; moderately alkaline; clear smooth boundary.

A14—24 to 35 inches; mixed very dark grayish brown (10YR 3/2) and very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure; friable; few roots; 1 inch gravel layer; few chert pebbles; some broken snail shells; violent effervescence; moderately alkaline; clear smooth boundary.

A15—35 to 40 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (10YR 3/3) loam, grayish brown (10YR 5/2) dry; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few roots; some broken snail shells; violent effervescence; moderately alkaline; gradual smooth boundary.

C1—40 to 47 inches; mixed brown (10YR 4/3) and dark brown (10YR 3/3) loam; weak medium subangular blocky structure; very friable; few roots; some broken snail shells; violent effervescence; moderately alkaline; gradual smooth boundary.

C2—47 to 51 inches; mixed brown (10YR 4/3) and dark brown (10YR 3/3) sandy loam; weak medium subangular blocky structure; very friable; few roots; some broken snail shells; violent effervescence; moderately alkaline; clear smooth boundary.

C3—51 to 60 inches; brown (10YR 4/3) loamy sand; massive, very weak very coarse structure in places; very friable; few roots; some broken snail shells; violent effervescence; moderately alkaline.

The solum and mollic epipedon range from 24 to 40 inches in thickness. Some pedons do not have thin strata of shell fragments, and some have gravel at a depth of more than 24 inches.

The A horizon has color value of 2 or 3 and chroma of 1 through 3. The A horizon is silt loam or loam. Some pedons have a B horizon. The C horizon ranges from loam or sandy loam to sandy clay loam. It commonly is strongly calcareous and generally contains many snail shell fragments.

Durand series

This series consists of well drained soils that have moderate permeability. These soils formed in loess and in reddish glacial drift under prairie vegetation on till plains. Slope ranges from 2 to 10 percent.

Durand soils are similar to and are near Griswold, Jasper, Ogle, and Winnebago soils. Griswold and Jasper soils do not have reddish colors in the B horizon. Ogle soils have less sand in the control section. Winnebago soils have more sand in the upper part of the B horizon.

Typical pedon from an area of Durand silt loam, 2 to 5 percent slopes, on a ridge about 2 miles southwest of Byron, 1,320 feet east and 165 feet south of northwest corner of sec. 7, T. 24 N., R. 11 E.

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

A3—7 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

B21t—13 to 20 inches; dark brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous

dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB22t—20 to 26 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; some pebbles; strongly acid; clear smooth boundary.

IIB23t—26 to 32 inches; dark brown (7.5YR 4/4) loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark reddish brown (5YR 3/4) clay films on faces of peds; medium acid; clear smooth boundary.

IIB24t—32 to 60 inches; yellowish red (7.5YR 4/4) loam; weak coarse prismatic structure; friable; few roots; thin patchy reddish brown (5YR 4/4) clay films on faces of peds; stone line at a depth of 35 inches; gradually becomes redder approaching a depth of 60 inches; medium acid.

The solum ranges from 4 to 8 feet or more in thickness, depending upon the degree of erosion of the buried soil before loess deposition.

The A horizon ranges from 10 inches to about 18 inches in thickness. The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The upper part of the B horizon that formed in loess has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. The IIB2 horizon has hue of 7.5YR, 5YR, or 2.5YR. It ranges in texture to clay loam, gravelly sandy loam, or loam. Where present, the C horizon is calcareous gravelly sandy loam, sandy loam, or loam.

In map unit 416C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Elburn series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess or silty material over loamy stratified material. They formed under prairie vegetation on till and outwash plains and stream terraces. Slope ranges from 0 to 3 percent.

Elburn soils are near Drummer, Flanagan, La Hogue, and Muscatine soils. Drummer soils are poorly drained. Flanagan soils are underlain by loamy glacial till at a depth of 40 to 60 inches. La Hogue soils have more sand in the solum. Muscatine soils formed in loess more than 60 inches thick.

Typical pedon from an area of Elburn silt loam on a loess covered outwash plain about 1 1/2 miles south and 2 1/2 miles east of Lindenwood, 1,238 feet south and 29 feet east of northwest corner of sec. 14, T. 41 N., R. 2 E.

A11—0 to 13 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common roots; high pH may be caused by road dust; mildly alkaline; clear smooth boundary.

A12—13 to 17 inches; very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; moderate medium and coarse granular structure; friable; common roots; neutral; clear smooth boundary.

A3—17 to 21 inches; mixed very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) silt loam, gray (10YR 5/1) and light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure parting to moderate medium and coarse granular; friable; common roots; slightly acid; clear smooth boundary.

B21t—21 to 26 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate very fine and fine subangular blocky; friable; few roots; thin patchy dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear smooth boundary.

B22t—26 to 37 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate fine and medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few roots; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; 1 large root channel; neutral; clear smooth boundary.

B23t—37 to 51 inches; grayish brown (10YR 5/2) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; firm; few roots; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); thin patchy dark gray (10YR 4/1) organic and clay coatings on faces of peds; neutral; clear smooth boundary.

IIB3—51 to 59 inches; grayish brown (10YR 5/2) loam; many medium distinct yellowish brown (10YR 5/6 & 5/8) and common medium faint gray (10YR 5/1) mottles; weak medium and coarse prismatic structure; friable; few fine dark accumulations (iron and manganese oxides); neutral; gradual smooth boundary.

IIC—59 to 70 inches; mottled gray (10YR 5/1), dark gray (10YR 4/1), and yellowish brown (10YR 5/8) gravelly sandy loam; massive; friable; few fine dark accumulations (iron and manganese oxides); mildly alkaline.

The solum is typically 45 to 60 inches thick but is as much as 70 inches thick in places. The solum mainly ranges from medium acid to neutral, but the lower part is moderately alkaline in places.

The A horizon ranges from 10 to 23 inches in thickness. The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR or

2.5Y, value of 4 or 5, and chroma of 2 through 4. The IIB horizon is silt loam, loam, sandy loam, or clay loam. The IIC horizon is stratified loamy outwash or, in some pedons, calcareous sandy loam till.

Elco series

This series consists of moderately well drained soils that have moderate permeability in the upper part of the solum and moderately slow permeability in the lower part. These soils formed in 20 to 40 inches of loess or other silty material and in the underlying glacial drift. They formed under forest vegetation. Slope ranges from 5 to 10 percent.

Elco soils are similar to and are near Fayette, Flagg, Rozetta, and St. Charles soils. Fayette, Rozetta, and St. Charles soils formed in thicker loess deposit and do not have a buried soil. Flagg soils have a B horizon that is redder in hue.

Typical pedon from an area of Elco silt loam, 5 to 10 percent slopes, eroded, on a convex side slope about 4 miles north and 1 1/2 miles east of Byron, 1,416 feet west and 255 feet north of southeast corner of sec. 4, T. 25 N., R. 11 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) mixed with some dark brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

A2—8 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak thin and medium platy structure parting to moderate very fine and fine granular; friable; common roots; few light gray (10YR 7/1) uncoated silt grains on faces of peds; few grayish brown (10YR 5/2) worm channel fillings; slightly acid; clear smooth boundary.

B1t—12 to 19 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous brown (10YR 5/3) and dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B21t—19 to 27 inches; yellowish brown (10YR 5/4) silty clay loam; common medium faint yellowish brown mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; common roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; abrupt smooth boundary.

IIB22tb—27 to 31 inches; dark brown (10YR 3/3) silty clay loam; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; common roots; thick continuous very dark grayish brown (10YR 3/2) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB23tb—31 to 38 inches; very dark gray (10YR 3/1) clay loam; moderate coarse prismatic structure; friable; few roots; thick continuous very dark grayish brown (10YR 3/2) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; some glacial pebbles present; few fine dark accumulations (iron and manganese oxides); strongly acid; abrupt smooth boundary.

IIB24tb—38 to 49 inches; dark grayish brown (2.5Y 4/2) loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; few roots; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; some glacial pebbles present; some sand grains on faces of peds; strongly acid; gradual smooth boundary.

IIB3b—49 to 67 inches; mixed dark grayish brown (2.5Y 4/2), olive brown (2.5Y 4/4), and grayish brown (2.5Y 5/2) loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; friable; some glacial pebbles; medium acid.

The solum ranges from 4 feet to more than 7 feet in thickness. The thickness of the silty material and the depth to the buried soil ranges from 20 to 40 inches.

Most pedons have an Ap horizon that includes the A1 horizon and most of the A2 horizon. Where present, the A1 horizon is less than 5 inches thick. The A2 horizon has color value of 4 or 5 and chroma of 2 through 4. The B2 horizon has color value of 4 or 5 and chroma of 3 through 6. The IIB horizon has hue of 10YR, 2.5Y, or 5Y; value of 3 through 5; and chroma of 1 or 2. The B and IIB horizons typically are medium acid or slightly acid, but they range from strongly acid to neutral.

Eleva series

This series consists of well drained and somewhat excessively drained soils that have moderately rapid permeability in the upper part of the solum and rapid permeability in the lower part of the solum and the substratum. These soils formed in thin loess or residuum over sandstone bedrock. They formed under forest vegetation. Slope ranges from 2 to 35 percent.

Eleva soils are near Boone, Chelsea, and Martinsville soils. Boone soils have less clay and more sand in the solum. Chelsea and Martinsville soils do not have sandstone bedrock within a depth of 60 inches.

Typical pedon from an area of Eleva sandy loam, 7 to 15 percent slopes, on a side slope about 3 miles northeast of Grand Detour, 2,077 feet east and 9 feet south of the northwest corner of sec. 5, T. 22 N., R. 10 E.

A1—0 to 3 inches; very dark gray (10YR 3/1) mixed with some brown (10YR 4/3) sandy loam, gray (10YR

6/1) dry; moderate very fine and fine granular structure; friable; many roots; 1 inch of leaf litter on surface; neutral; clear smooth boundary.

A2—3 to 7 inches; yellowish brown (10YR 5/4) sandy loam; weak fine and medium subangular blocky structure; friable; common roots; neutral; clear smooth boundary.

B21t—7 to 13 inches; yellowish brown (10YR 5/6) sandy loam; weak fine and medium subangular blocky structure; friable; common roots; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—13 to 21 inches; yellowish brown (10YR 5/6) sandy loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; few pebbles; strongly acid; clear smooth boundary.

B3t—21 to 28 inches; thin stratified yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) loamy sand; weak medium subangular blocky structure; very friable; few roots; thin patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; many small chunks of sandstone rock; strongly acid; gradual smooth boundary.

C—28 to 35 inches; brownish yellow (10YR 6/6) and some yellowish brown (10YR 5/6) sand; single grained; loose; few roots; weakly cemented sandstone; strongly acid; gradual smooth boundary.

R—35 inches; mixed yellow (10YR 7/6) and very pale brown (10YR 7/4) hard sandstone.

The solum ranges from 20 to 40 inches in thickness. Strongly cemented sandstone typically is at a depth ranging from 30 to 60 inches. The solum ranges from slightly acid to strongly acid, but in some pedons, it is very strongly acid.

The A horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 1 through 3. The B2t horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. It is sandy loam or loam. Some pedons do not have a B3 horizon.

Fayette series

The Fayette series consists of well drained soils that have moderate permeability. These soils formed in deep loess under forest vegetation on uplands. Slope ranges from 2 to 15 percent.

Fayette soils are similar to and are near Downs, Flagg, Palsgrove, Rozetta, and St. Charles soils. Downs soils have a thicker and darker A1 horizon and a less distinct A2 horizon. Flagg soils are underlain by glacial till within 60 inches of the surface. Palsgrove soils have more clay in the lower part of the solum and are underlain by limestone and dolomite bedrock. Rozetta soils contain mottles that have chroma of 2 or less within a depth of 30 inches. St. Charles soils have more sand and less clay in the lower part of the solum.

Typical pedon from an area of Fayette silt loam, 2 to 5 percent slopes (fig. 11), on a loess covered upland about 5 miles north and 1 mile east of Grand Detour, 3,505 feet south and 489 feet east of the northwest corner of sec. 19, T. 23 N., R. 10 E.

Figure 11.—Roadcut showing the horizon sequence of Fayette silt loam, 2 to 5 percent slopes.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of tillage; medium acid; abrupt smooth boundary.

A2—7 to 11 inches; yellowish brown (10YR 5/4) silt loam; weak thin platy structure parting to moderate fine granular; friable; common roots; light gray (10YR 7/1) dry uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B21t—11 to 19 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) dry uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B22t—19 to 28 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) dry uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides) in lower half of horizon; strongly acid; clear smooth boundary.

B23t—28 to 44 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) dry uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; gradual smooth boundary.

B3t—44 to 54 inches; mixed dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4), and brownish yellow (10YR 6/6) silt loam; moderate coarse prismatic structure; friable; few roots; thin discontinuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) dry uncoated silt grains on faces of peds; common fine dark accumulations (iron and manganese oxides); some dark brown (10YR 3/3) root channel fillings; medium acid; gradual smooth boundary.

C—54 to 60 inches; mixed brown (10YR 5/3), yellowish brown (10YR 5/4 & 5/6), and brownish yellow (10YR 6/6) silt loam; massive with some distinct vertical cleavage; friable; few roots; light gray (10YR 7/1) dry uncoated silt grains on cleavage planes; common fine dark accumulations (iron and manganese oxides); medium acid.

The solum ranges from 36 to 60 inches in thickness. The Ap horizon has color value of 2 through 4 and chroma of 1 or 2. In some pedons, there is a B1 horizon. The B2 horizon has value of 4 or 5 and chroma of 3 or 4. Silt coatings commonly are not visible when moist. Mottles with hue of 10YR or 2.5Y, value of 5, and chroma of 2 are in the lower part of the B horizon and in the C horizon in a few pedons.

Flagg series

This series consists of well drained soils that have moderate permeability. These soils formed in 30 to 50 inches of loess over reddish glacial till. They formed under forest vegetation on till plains and moraines. Slope ranges from 2 to 10 percent.

Flagg soils are similar to and are near Fayette, Palsgrove, Pecatonica, and St. Charles soils. Fayette and St. Charles soils do not have a IIB horizon that has a hue of 5YR or redder. Palsgrove soils have more clay in the lower part of the B horizon and their solum is terminated by bedrock. Pecatonica soils have less than 30 inches of loess and more sand in the solum.

Typical pedon from an area of Flagg silt loam, 2 to 5 percent slopes, on an upland till plain about 6 miles northeast of Byron, 960 feet east and 956 feet south of northwest corner of sec. 2, T. 25 N., R. 11 E.

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

A2—6 to 10 inches; yellowish brown (10YR 5/4) silt loam; weak thin platy structure parting to moderate fine granular; friable; common roots; light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B1t—10 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine prismatic structure parting to moderate fine subangular block; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

B21t—18 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine prismatic structure parting to strong fine and medium subangular blocky; firm; common roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

B22t—24 to 32 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine prismatic structure parting to strong medium subangular blocky; firm; common roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B23t—32 to 40 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; 11 percent pebbles; very strongly acid; clear smooth boundary.

IIB24t—40 to 47 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate coarse prismatic struc-

ture; friable; few roots; thin continuous reddish brown (5YR 4/4) clay films and very pale brown (10YR 7/3) uncoated sand grains on faces of peds; 3 percent pebbles; strongly acid; gradual smooth boundary.

IIB25t—47 to 60 inches; yellowish red (5YR 4/6) sandy clay loam; moderate coarse prismatic structure; friable; few roots; moderate discontinuous reddish brown (5YR 4/4) clay films and very pale brown (10YR 7/3) uncoated sand grains on faces of peds; 3 percent pebbles; strongly acid.

The solum commonly is 5 feet or more thick. It typically is medium acid to very strongly acid.

The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. The B2t horizon that formed in loess has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3, 4, or 5. The IIB horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR; value of 4, 5, or 6; and chroma of 4, 5, or 6. Hue of 5YR or redder is in the matrix in at least one subhorizon in the IIBt horizon. The IIB horizon is silty clay loam and has some sand, clay loam, or sandy clay loam. The C horizon, where present, typically is loam, clay loam, or sandy loam.

Flanagan series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess overlying calcareous till or lakebed sediment. They formed under prairie vegetation. Slope ranges from 0 to 3 percent.

Flanagan soils are similar to Elburn soils and are near Catlin, Muscatine, Odell, and Saybrook soils. Elburn soils have more sand in the B horizon and C horizon of stratified loamy outwash. Catlin and Saybrook soils have better natural drainage. Muscatine soils have less sand in the lower part of the solum, and they formed in more than 60 inches of loess. Odell soils have a thinner solum, and they have more sand in the solum.

Typical pedon from an area of Flanagan silt loam, 0 to 3 percent slopes, on a loess covered till plain about 4 miles east of Lindenwood, 2,640 feet east and 335 feet south of northwest corner of sec. 12, T. 41 N., R. 2 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

A3—8 to 12 inches; very dark gray (10YR 3/1) mixed with some very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

B21t—12 to 18 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine faint yellowish brown (10YR 5/8) mottles; moderate very fine and fine subangular blocky structure; friable; common roots; thin continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; few black (10YR 2/1) root channels; medium acid; clear smooth boundary.

B22t—18 to 24 inches; grayish brown (10YR 5/2) mixed with some dark grayish brown (10YR 4/2) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate fine prismatic structure parting to moderate very fine and fine subangular blocky; friable; common roots; thin continuous clay films on faces of peds; medium acid; clear smooth boundary.

B23t—24 to 36 inches; grayish brown (10YR 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; common roots; moderate continuous gray (10YR 5/1) and thin patchy dark gray (10YR 4/1) clay films on faces of peds; few pebbles; slightly acid; clear smooth boundary.

B24t—36 to 46 inches; grayish brown (10YR 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure; firm; common roots; thick discontinuous grayish brown (2.5Y 5/2) and dark gray (10YR 4/1) and thick patchy very dark gray (10YR 3/1) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); neutral; clear smooth boundary.

IIB3t—46 to 52 inches; mottled dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4 & 5/6), and greenish gray (5G 6/1) silty clay loam; moderate coarse prismatic structure; firm; few roots; many light gray (10YR 7/2) calcium carbonate accumulations; common very dark gray (10YR 3/1) root channel linings; 1 percent gravel; slight effervescence; mildly alkaline; clear smooth boundary.

IIC—52 to 65 inches; mottled dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/4 & 5/6), and greenish gray (5G 6/1) silty clay loam; massive; firm; common roots; 1 percent gravel; violent effervescence; moderately alkaline.

The solum ranges from 44 to 60 inches in thickness and typically extends 4 to 14 inches into the loamy material.

The A horizon ranges from 11 to 18 inches in thickness. It has a color value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4. Chroma of 2 is either in the mottles or in the matrix. The IIB3 horizon is silt loam, loam, clay loam, or silty clay loam. The IIC horizon is loam, silt loam, clay loam, or silty clay loam.

Fox series

This series consists of well drained soils that have moderate permeability in the subsoil and rapid perme-

ability in the substratum. These soils formed in loamy outwash overlying stratified, calcareous sand and gravel. They formed under forest vegetation on outwash plains and terraces. Slope ranges from 1 to 5 percent.

Fox soils are similar to Warsaw soils and are near Dickinson, Lamont, and Wea soils. Warsaw soils have a mollic surface layer. Dickinson and Lamont soils do not have gravel in the solum and have a sandier surface layer. Wea soils are deeper to gravel.

Typical pedon from an area of Fox loam, 1 to 5 percent slopes, on a Rock River terrace about 3 miles southwest of Byron near Illinois Route 2, 330 feet east and 165 feet south of northwest corner of sec. 11, T. 24 N., R. 10 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; friable; few roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

B21t—5 to 10 inches; dark yellowish brown (10YR 4/4) mixed with some dark brown (10YR 3/3) loam; weak medium subangular blocky structure; friable; few roots; thin patchy very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

B22t—10 to 20 inches; dark yellowish brown (10YR 4/4) loam; weak medium and coarse subangular blocky structure; friable; few roots; thin patchy dark brown (10YR 4/3) clay films on faces of peds; neutral; gradual smooth boundary.

B23t—20 to 29 inches; dark yellowish brown (10YR 4/4) loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few roots; thin patchy dark brown (10YR 4/3) clay films on faces of peds; neutral; abrupt smooth boundary.

IIB3t—29 to 33 inches; dark brown (7.5Y 4/4) gravelly clay loam; weak medium and coarse subangular blocky structure; friable; few roots; very few thin clay films on faces of peds; mildly alkaline; clear wavy boundary.

IIC—33 to 60 inches; mixed dark brown (10YR 3/3) and light yellowish brown (10YR 6/4) sand and gravel; single grained; loose; strong effervescence; moderately alkaline.

The solum ranges from 24 inches to slightly less than 40 inches in thickness. It typically is less than 10 percent coarse fragments, but, in some pedons, it is as much as 25 percent.

The Ap horizon has color value of 3, 4, or 5 and chroma of 2 or 3. In undisturbed areas, the A1 horizon has color value of 2 or 3 and chroma of 1 or 2, and the A2 horizon has color value of 4 or 5 and chroma of 1 through 3. The A horizon is silt loam, loam, or sandy loam, or their gravelly counterparts. The Bt horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 3 through 5. The B2 horizon typically is loam, clay loam, or silty clay loam, but some thin subhorizons range to sandy clay loam. The IIC horizon is sand or gravelly sand.

Griswold series

This series consists of well drained soils that have moderate permeability. These soils formed mainly in outwash and calcareous sandy loam till. They formed under prairie vegetation on glacial till plains. Slope ranges from 2 to 10 percent.

Griswold soils are similar to and are near Durand, Jasper, and Parr soils on the landscape. Durand and Jasper soils have a thicker solum. Parr soils have less sand in the upper part of the solum.

Typical pedon from an area of Griswold loam, 2 to 5 percent slopes, on an upland till plain about 3 miles north and 2 1/2 miles east of Davis Junction, 903 feet east and 916 feet south of center of sec. 6, T. 42 N., R. 2 E.

Ap—0 to 8 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate very fine and fine granular structure; friable; many roots; layer compacted because of tillage; slightly acid; abrupt smooth boundary.

A3—8 to 14 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (10YR 4/3) loam, grayish brown (10YR 5/2) dry; moderate medium subangular blocky structure parting to moderate very fine and fine granular structure; friable; common roots; medium acid; clear smooth boundary.

B21t—14 to 19 inches; dark brown (10YR 4/3) clay loam; weak medium prismatic structure parting to weak fine subangular blocky; friable; common roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; slight tendency towards prismatic structure; medium acid; clear smooth boundary.

B22t—19 to 28 inches; yellowish brown (10YR 5/4) sandy clay loam; moderate medium prismatic structure parting to weak fine and medium subangular blocky; friable; common roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 2 percent pebbles; slightly acid; clear smooth boundary.

B3—28 to 34 inches; light yellowish brown (10YR 6/4) sandy loam; weak coarse prismatic structure; very friable; few roots; 13 percent pebbles, many are 1/2 to 1 inch in diameter; slight effervescence; moderately alkaline; clear smooth boundary.

C1—34 to 41 inches; brownish yellow (10YR 6/6) sandy loam; massive; friable; few roots; 19 percent pebbles, many 1/2 to 3 inches in diameter; strong effervescence; moderately alkaline; abrupt smooth boundary.

C2—41 to 60 inches; mixed yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) gravelly sandy loam; massive; friable; few roots; 25 percent peb-

bles, a few 1/2 to 1 inch in diameter; strong effervescence; moderately alkaline.

The solum ranges from 24 to 36 inches in thickness. Coarse fragments make up less than 10 percent, by volume, of the solum.

The A horizon ranges from 10 to 18 inches in thickness. It has color value of 2 or 3 and chroma of 1, 2, or 3. It is sandy loam, loam, or silt loam. Some pedons do not have an A3 horizon. The B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 5. In some pedons, mottles are in the lower part of the B horizon.

In map unit 363C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Hitt Variant

This series consists of well drained soils that have moderately rapid permeability in the upper part of the subsoil and slow permeability in the lower part. These soils formed in eolian material, glacial drift, and residuum from limestone bedrock. They formed under prairie vegetation on bedrock uplands. Slope ranges from 2 to 10 percent.

Hitt soils are similar to and are near Durand, Jasper, Plano, and Rockton soils. Durand, Jasper, and Plano soils do not have limestone bedrock within 60 inches of the surface. Rockton soils have a solum that is terminated by limestone bedrock within 40 inches of the surface.

Typical pedon from an area of Hitt Variant sandy loam, 2 to 5 percent slopes, on a bedrock controlled, upland ridge about 2 miles southwest of Byron, 495 feet south and 742 feet east of northwest corner of sec. 7, T. 24 N., R. 11 E.

Ap—0 to 6 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; moderate fine and very fine granular structure; friable; common roots; slightly acid; abrupt smooth boundary.

A12—6 to 15 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; moderate fine and very fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

B1—15 to 24 inches; mixed dark brown and brown (10YR 4/3 and 3/3) sandy loam; weak medium subangular blocky structure; friable; common roots; slightly acid; clear smooth boundary.

B21t—24 to 31 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

IIB22t—31 to 36 inches; dark brown (7.5YR 4/4) loam; moderate medium subangular blocky structure; friable; few roots; thin patchy dark reddish brown (5YR 3/4) clay films on faces of peds; some pebbles; medium acid; clear smooth boundary.

IIB23t—36 to 40 inches; reddish brown (5YR 4/4) clay loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; thin patchy dark reddish brown clay films on faces of peds; medium acid; abrupt smooth boundary.

IIIB3—40 to 44 inches; dark reddish brown (5YR 3/4) clay; moderate medium prismatic structure; firm; few roots; medium acid; abrupt smooth boundary.

IIIR—44 inches; brownish yellow (10YR 6/6) limestone bedrock.

The solum commonly is 40 to 50 inches thick but ranges to 60 inches in thickness. Limestone bedrock is at a depth ranging from 40 to 60 inches.

The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2, and the A3 typically has chroma of 3. Typically, the B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. The IIB horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 3, 4, or 5. It typically is clay loam or loam, but some subhorizons are sandy clay loam. The IIIB horizon has color value and chroma of 3 or 4. It is silty clay or clay, and the chert content is variable.

Houghton series

This series consists of very poorly drained soils that have moderately slow to moderately rapid permeability. These soils formed in bogs of mostly decomposed marsh grasses, sedges, reeds, and cattails on outwash and flood plains. Slope ranges from 0 to 3 percent.

Houghton soils are near Comfrey, Drummer, Sawmill, and Selma soils. All these soils formed in mineral sources and contain much less organic matter in the solum.

Typical pedon from an area of Houghton muck on a flood plain about 1 1/2 miles east and 2 miles north of Davis Junction, 1,630 feet west and 1,467 feet north of southeast corner of sec. 12, T. 42 N., R. 1 E.

Oa1—0 to 8 inches; black (N 2/0) broken face and rubbed sapric material; about 12 percent fiber, less than 3 percent rubbed; moderate medium subangular blocky structure parting to moderate fine subangular blocky; very friable; many fresh roots; trace of mineral soil; mildly alkaline (pH 7.4 in Truog); clear smooth boundary.

Oa2—8 to 19 inches; black (N 2/0) broken face and rubbed sapric material; about 20 percent fiber, less than 5 percent rubbed; moderate coarse prismatic structure parting to weak medium prismatic and subangular blocky; very friable; common fresh roots; about 5 to 15 percent mineral soil; dark brown (7.5YR 4/4) fiber stems; mildly alkaline (pH 7.4 in Truog); gradual smooth boundary.

Oa3—19 to 60 inches; black (N 2/0) broken face and rubbed sapric material; about 20 percent fiber, less than 5 percent rubbed; weak coarse prismatic struc-

ture; very friable; few fresh roots; about 20 percent mineral soil; mildly alkaline (pH 7.4 in Truog).

The organic layers are more than 51 inches thick and are assumed to be mainly herbaceous. Some pedons contain woody fragments, about 1/2 to 8 inches in diameter, that cannot be crushed between the fingers.

Layers within the control section have hue of 10YR, 7.5YR, 5YR, or neutral; value of 2 or 3; and chroma of 0 through 3. Color of broken surfaces may become darker on brief exposure to air.

The solum commonly is 40 to 50 inches thick but ranges to 60 inches in thickness. Limestone bedrock is at a depth ranging from 40 to 60 inches.

The A1 or Ap horizon has color value of 2 o3 3 and chroma of 1 or 2, and the A3 typically has chroma of 3. Typically, the B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. The IIB horizon has hue of 2.5YR, 5YR, or 7.5YR and value and chroma of 3, 4, or 5. It typically is clay loam or loam, but some subhorizons are sandy clay loam. The IIB horizon has color value and chroma of 3 or 4. It is silty clay or clay, and the chert content is variable.

Huntsville series

This series consists of well drained soils that have moderate permeability. These soils formed in silty alluvium on bottom lands under prairie vegetation. Slope ranges from 0 to 3 percent. They are more acid and contain more clay in the lower part of the control section and have a thicker mollic epipedon than defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Huntsville soils are similar to Lawson and Ross soils and are near Lawson, Plano, Sawmill, and Tama soils. Ross soils are fine-loamy. Lawson and Sawmill soils have poorer natural drainage. Plano and Tama soils do not have a cumulic layer.

Typical pedon from an area of Huntsville silt loam on a small stream botton land about 2 miles east of Baileyville, 2,060 feet west and 668 feet south of northeast corner of sec. 3, T. 25 N., R. 8 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common roots; layer compacted because of tillage; medium acid; abrupt smooth boundary.

A12—9 to 13 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; common roots; light gray (10YR 7/1) uncoated silt grains on faces of peds; slightly acid; clear smooth boundary.

A13—13 to 32 inches; mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate fine and medium platy structure; friable; common roots; light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; abrupt smooth boundary.

A14—32 to 39 inches; mixed very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; few roots; thin patchy very dark gray (10YR 3/1) organic films on faces of peds; medium acid; clear smooth boundary.

A15—39 to 50 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak medium platy structure parting to weak very fine and fine subangular blocky; friable; few roots; medium acid; clear smooth boundary.

B2t—50 to 60 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid.

The soil to a depth of at least 40 inches is typically silt loam underlain by loam, silty clay loam, or silt loam that contains thin strata of sandy loam in places. It is medium acid or slightly acid.

The A horizon is at least 24 inches thick. It has hue of 10YR, value of 2 or 3, and chroma of 1 or 2 in the upper part and 1 through 3 in the lower part. Mottles are in some pedons at a depth of more than 30 inches.

Jasper series

This series consists of well drained soils that have moderate permeability. These soils formed in loamy outwash or wind deposits under prairie vegetation on outwash plains. Slope ranges from 0 to 10 percent.

Jasper soils are similar to and are near the Elburn, La Hogue, and Plano soils. Elburn and La Hogue soils have poorer natural drainage. Plano soils have less sand in the upper part of the solum.

Typical pedon from an area of Jasper loam, 2 to 5 percent slopes, on an outwash plain about 1 1/4 miles southeast of Kings, 2,574 feet west and 111 feet north of southeast corner of sec. 26, T. 41 N., R. 1 E.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; moderate medium and fine granular structure; friable; few roots; slightly acid; abrupt smooth boundary.

A12—9 to 13 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; fine granular structure; friable; few roots; neutral; clear smooth boundary.

B1t—13 to 22 inches; brown (10YR 4/3) silt loam; moderate fine and medium subangular blocky structure; friable; few roots; thin discontinuous dark brown

(10YR 3/3) clay films on faces of peds; many sand grains visible; neutral; clear smooth boundary.

B21t—22 to 37 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; few roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; 3-inch strata of brown (10YR 5/3) silt loam near lower part of horizon; medium acid; clear smooth boundary.

B22t—37 to 43 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few roots; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear smooth boundary.

B3—43 to 47 inches; dark yellowish brown (10YR 4/4) loamy sand; weak coarse prismatic structure; very friable; few roots; slightly acid; abrupt smooth boundary.

C—47 to 64 inches; stratified yellowish brown (10YR 5/4) and brown (10YR 5/3) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; few roots; slightly acid.

The solum ranges from 30 to 48 inches in thickness. The A1 horizon ranges from 10 to 18 inches in thickness. It has color value of 2 or 3 and chroma of 1 or 2. The A horizon is typically loam but is silt loam or fine sandy loam in places. The B horizon has 10YR or 7.5YR hue, value of 4 or 5, and chroma of 4 through 8. The C horizon is silt loam or stratified layers of silt loam to sand.

In map unit 440C2, the surface layer is thinner than defined as the range of the series, but this difference does not alter the use or behavior of the soil.

Kendall series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess and moderately coarse textured glacial outwash. They formed under forest vegetation on outwash plains and stream terraces. Slope ranges from 0 to 3 percent.

Kendall soils are near Birkbeck, Flanagan, Martinsville, and St. Charles soils. Birkbeck, Martinsville, and St. Charles soils have better natural drainage. Flanagan soils have heavier till between depths of 40 and 60 inches.

Typical pedon from an area of Kendall silt loam, 0 to 3 percent slopes, on an outwash plain about 1 mile southwest of Flagg Center, 740 feet south and 1,281 feet west of northeast corner of sec. 20, T. 40 N., R. 1 E.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 6/1) dry; moderate fine and medium granular structure; friable; many roots; neutral; clear smooth boundary.

A2—4 to 10 inches; mixed grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) silt loam; weak medium platy structure parting to moderate fine and medium granular; friable; common roots; slightly acid; clear smooth boundary.

B1t—10 to 14 inches; mixed brown (10YR 5/3) and dark brown (10YR 4/3) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin continuous dark grayish brown (10YR 4/2) and few patchy very dark gray (10YR 3/1) clay films on faces of peds; strongly acid; clear smooth boundary.

B21t—14 to 21 inches; mixed brown (10YR 5/3) and dark brown (10YR 4/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin continuous dark grayish brown (10YR 4/2) and thin patchy very dark gray (10YR 3/1) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

B22t—21 to 28 inches; olive (5Y 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; common roots; thin discontinuous olive gray (5Y 4/2 & 5/2) and moderate discontinuous very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

B23—28 to 43 inches; mottled olive gray (5Y 5/2), yellowish brown (10YR 5/6 & 5/8), and dark brown (10YR 4/3 & 3/3) silty clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; firm; common roots; some black (10YR 2/1) and dark grayish brown (10YR 3/2) root channel linings; few fine dark accumulations (iron and manganese oxides); strongly acid; clear smooth boundary.

IIB3—43 to 46 inches; mottled yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) loam; weak coarse prismatic structure; friable; few roots; few black (10YR 2/1) root channel linings; few fine dark accumulations (iron and manganese oxides); mildly alkaline; abrupt smooth boundary.

IIC1—46 to 52 inches; mottled yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) silt loam; massive; friable; few fine dark concretions (iron and manganese oxides); 15 percent pebbles; mildly alkaline; clear smooth boundary.

IIC2—52 to 61 inches; mottled yellowish brown (10YR 5/4 & 5/6) and grayish brown (10YR 5/2) sandy loam; massive; friable; few roots; a tendency towards weak coarse prismatic structure; 2 percent pebbles; few black (10YR 2/1) root channels; few

fine dark accumulations (iron and manganese oxides); slight effervescence; moderately alkaline.

The solum typically is 45 to 60 inches thick, and it ranges from 44 to 70 inches in thickness. Carbonates are at a depth ranging from 45 to 70 inches.

The A horizon is 10 to 18 inches thick. The A1 horizon has color value of 2 or 3 and chroma of 1 or 2. The Ap horizon, when present, has color value of 4 or 5 and chroma of 2 or 3. The upper part of the B horizon has color value of 4 or 5 and chroma of 3 or 4; the lower part has hue of 10YR, 2.5Y, and less commonly 5Y and chroma of 2 through 6. The IIC horizon is stratified, loamy outwash consisting of layers of silt loam, loam, sandy loam, sandy clay loam, and clay loam. Some pedons have a IIC horizon of sandy loam glacial till.

Kidder series

This series consists of well drained soils that have moderate permeability in the solum and moderately rapid permeability in the substratum. These soils formed in a thin layer of loess over calcareous sandy loam till. They formed under forest vegetation on moraines and till plains. Slope ranges from 2 to 15 percent.

Kidder soils are near Flagg, Martinsville, Miami, and Pecatonica soils. Flagg soils has less sand in the A horizon and the upper part of the B horizon. At least part of the solum of Martinsville soils formed in stratified sand and silt. Miami soils do not have a calcareous sandy loam C horizon at a depth of less than 40 inches. Pecatonica soils have a thicker, redder solum.

Typical pedon from an area of Kidder loam, 5 to 10 percent slopes, eroded, on an upland till plain about 2 1/2 miles north and 1 mile west of Leaf River, 1,566 feet north and 908 feet west of southeast corner of sec. 14, T. 25 N., R. 9 E.

Ap—0 to 5 inches; dark brown (10YR 4/3) mixed with some dark brown (7.5YR 4/4) loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of tillage; few pebbles; neutral; abrupt smooth boundary.

B21t—5 to 14 inches; dark brown (7.5YR 4/4) clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; common roots; thin continuous clay films on faces of peds; few pebbles; slightly acid; clear smooth boundary.

B22t—14 to 20 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common roots; moderate continuous dark brown (7/5YR 4/4) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides) in lower part of the horizon; medium acid; clear smooth boundary.

B23t—20 to 29 inches; dark yellowish brown (10YR 4/4) clay loam; moderate coarse prismatic structure; firm; common roots; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; common pebbles; medium acid; abrupt smooth boundary.

B3t—29 to 36 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) gravelly clay loam; weak coarse prismatic structure; firm; few roots; thick patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; about 15 percent calcareous gravel and a few dolomite cobbles; slight effervescence; mildly alkaline; clear smooth boundary.

C—36 to 60 inches; yellowish brown (10YR 5/6) sandy loam; about 10 percent gravel; strong effervescence; moderately alkaline.

The solum ranges from 24 to 40 inches in thickness. Coarse fragments make up as much as 15 percent, by volume, of the solum.

The Ap horizon typically has color value of 3 or 4 and chroma of 2 or 3. It is loam, silt loam, sandy loam, or fine sandy loam. The A2 horizon, where present, commonly is less than 5 inches thick and has color value of 4 or 5 and chroma of 2 or 3. It is loam, silt loam, or sandy loam. The B2t horizon has hue of 10YR or 7.5YR and value and chroma of 3 or 4. It typically is loam, sandy clay loam, or clay loam. Coarse fragments range from 5 to 35 percent, by volume, of the C horizon.

La Hogue series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in loamy and sandy outwash on stream terraces and plains. They formed under prairie vegetation. Slope ranges from 0 to 3 percent. These soils are shallower to free carbonates, contain less sand throughout, and are less acid throughout the solum than defined as the range of the series. These differences do not alter the use or behavior of the soil.

La Hogue soils are similar to Elburn and Odell soils and are near Canisteo, Comfrey, Dickinson, and Selma soils. Elburn soils have a fine-silty solum. Odell soils contain more clay in the lower part of the B horizon and are underlain by glacial till. Canisteo, Comfrey, and Selma soils are all poorly drained. Dickinson soils are well drained and at higher position on the landscape.

Typical pedon from an area of La Hogue loam on an outwash plain about 2 miles north and 2 miles east of Rochelle, 1,444 feet east and 203 feet south of northwest corner of sec. 8, T. 40 N., R. 2 E.

Ap—0 to 10 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate very fine and fine structure; friable; few roots; layer compacted because of tillage; neutral; clear smooth boundary.

A12—10 to 18 inches; mixed very dark grayish brown (10YR 3/2) and black (10YR 2/1) loam, grayish brown (10YR 5/2) dry; moderate fine and medium granular structure; friable; few roots; mildly alkaline; clear smooth boundary.

B1t—18 to 22 inches; dark grayish brown (2.5Y 4/2) clay loam; weak fine and medium subangular blocky structure; friable; few roots; thin continuous very dark grayish brown (2.5Y 3/2) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); few sand grains visible; a few very dark grayish brown (10YR 3/2) tongues of loam from horizon above; mildly alkaline; clear smooth boundary.

B2t—22 to 28 inches; grayish brown (2.5Y 5/2) clay loam, common fine prominent yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable; few roots; thin discontinuous dark gray (5Y 4/1) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); very dark gray (10YR 3/1) krotovina remnant; mildly alkaline; clear smooth boundary.

B3t—28 to 42 inches; olive gray (5Y 5/2) silt loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable; few roots; thin discontinuous gray (5Y 5/1) clay films on faces of peds; many fine dark concretions (iron and manganese oxides); color and texture stratified in lower 2 inches; mildly alkaline; abrupt smooth boundary.

C—42 to 62 inches; mottled olive gray (5Y 5/2) and light olive gray (5Y 6/2) stratified silt loam, loam, sandy loam, and loamy sand; many coarse prominent yellowish brown (10YR 5/6 and 5/8) mottles; massive; friable; strong effervescence; moderately alkaline.

The solum ranges from 40 to 60 inches in thickness. The A horizon ranges from 10 to 24 inches in thickness.

The A horizon is loam or sandy loam and has color value of 2 or 3 and chroma of 1 or 2. The B horizon typically has hue of 10YR, 7.5YR, or 2.5Y and 5Y in lower part; value of 4 through 6; and chroma of 2 through 6. The B2 horizon is loam, clay loam, or sandy clay loam. The C horizon is stratified loamy sand, sand, loam, sandy loam, silt loam, and some fine pebbles.

Lamont series

This series consists of well drained soils that have moderately rapid permeability in the solum and very rapid permeability in the underlying material. These soils formed in wind-worked sand deposits on outwash plains and stream terraces. They formed under woods. Slope ranges from 10 to 12 percent.

Lamont soils are similar to Dickinson soils and are near Chelsea, Comfrey, Eleva, and Martinsville soils. Dickinson soils have a mollic surface layer. Chelsea soils have less clay in the upper part of the solum. Comfrey soils are poorly drained. Eleva soils have a solum that is terminated by sandstone bedrock at a depth of less than 40 inches. Martinsville soils have more clay in the solum.

Typical pedon from an area of Lamont sandy loam, 1 to 5 percent slopes, on the Rock River terrace about 2 miles south of Oregon, 2,063 feet south and 1,980 feet east of northwest corner of sec. 22, T. 23 N., R. 10 E.

A1—0 to 5 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 6/1) dry; moderate very fine and fine granular structure; friable; many roots; mildly alkaline; clear smooth boundary.

B1—5 to 11 inches; dark brown (10YR 4/3) sandy loam; weak medium subangular blocky structure; friable; common roots; very dark grayish brown (10YR 3/2) worm channel linings; neutral; clear smooth boundary.

B2t—11 to 21 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few roots; thin patchy dark yellowish brown (10YR 4/3) clay films on faces of peds; neutral; gradual smooth boundary.

B3t—21 to 31 inches; yellowish brown (10YR 5/6) sandy loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; few roots; thin patchy yellowish brown (10YR 5/4) clay films on faces of peds; few very thin iron stain lamellae at base of horizon; neutral; clear smooth boundary.

C—31 to 41 inches; mixed brownish yellow (10YR 6/6) and yellow (10YR 7/6) loamy sand; single grained; very friable; few roots; strongly acid; abrupt smooth boundary.

A&B—41 to 60 inches; mixed yellowish brown (10YR 5/6) and yellow (10YR 7/6) sand (A2); single grained; loose; 2-inch sandy loam band (B2) at a depth of 41 inches; strongly acid.

The solum ranges from 30 to 60 inches in thickness.

The A1 horizon has color value of 3 or 4 and chroma of 1 or 2. It typically is sandy loam but less commonly loam. The B1 horizon is not present in some pedons. The B2t horizon has hue of 10YR or 7.5Y, value of 4 through 6, and chroma of 4 through 6. It is typically sandy loam, but it is loam or sandy clay loam in places. The C horizon is fine sandy loam, loamy sand, sand, or loamy fine sand. In the A&B horizon, bands of sandy loam or loamy sand are 1/2 inch to 2 inches thick. The depth to the uppermost band typically is about 3 1/2 feet but ranges from 2 1/2 to 5 feet.

La Rose series

This series consists of well drained soils that have moderate permeability. These soils formed in 10 inches or less of loess or silty material and loam or clay loam till. They formed under prairie vegetation on uplands. Slope ranges from 5 to 10 percent.

La Rose soils are similar to Parr soils and are near Catlin, Elburn, Flanagan, and Saybrook soils. Parr soils have a thicker solum. Catlin and Saybrook soils have less sand in the solum and are deeper to glacial till. Elburn and Flanagan soils have poorer natural drainage and have less sand in the solum than La Rose soils.

Typical pedon from an area of La Rose silt loam, 5 to 10 percent slopes, eroded, on a convex side slope about 1 mile north of Creston, 886 feet east and 596 feet north of center of sec. 14, T. 40 N., R. 2 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (7.5YR 4/4) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

B21t—8 to 15 inches; dark brown (7.5YR 4/4) clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin discontinuous dark brown (7.5YR 4/2) clay films on faces of peds; few small pebbles; mildly alkaline; gradual smooth boundary.

B22t—15 to 20 inches; dark brown (7.5YR 4/4) clay loam; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin patchy dark brown (7.5YR 4/2) clay films on faces of peds; few small pebbles; mildly alkaline; abrupt smooth boundary.

C—20 to 60 inches; brown (7.5YR 5/4) loam; massive, some very weak till structure; firm; few roots; common pebbles; violent effervescence; moderately alkaline.

The solum thickness and depth to calcareous glacial till range from 10 to 24 inches.

The A1 or Ap horizon is loam or silt loam. The B horizon typically has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It ranges from medium acid to mildly alkaline.

Lawson series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in silty alluvium under prairie vegetation on flood plains. Slope ranges from 0 to 3 percent. The dark colored surface layer is thicker than is defined as the range of the series, but this difference does not alter the use or behavior of the soil.

Lawson soils are similar to Huntsville soils and are near Comfrey, Huntsville, Orion, Radford, and Sawmill soils. Comfrey and Sawmill soils have poor natural drainage. Huntsville soils have better natural drainage. Orion soils do not have a mollic surface layer. Radford soils have a buried, dark colored silty clay loam horizon at a depth of less than 40 inches.

Typical pedon from an area of Lawson silt loam on Mud Creek flood plain about 2 miles northeast of Adeline, 225 feet west and 135 feet north of the southeast corner of sec. 16, T. 25 N., R. 9 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; many roots; mildly alkaline; abrupt smooth boundary.

A12—8 to 20 inches; very dark gray (10YR 3/1) silt loam; grayish brown (10YR 5/2) or brown (10YR 5/3) dry; weak medium platy structure parting to moderate fine and medium granular; friable; common roots; few discontinuous lenses of dark brown (10YR 4/3) silt; mildly alkaline; clear smooth boundary.

A13—20 to 35 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; few fine prominent yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; few roots; mildly alkaline; clear smooth boundary.

A14—35 to 50 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; common fine prominent yellowish red (5YR 4/8) mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; mildly alkaline; gradual smooth boundary.

A15—50 to 59 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak coarse prismatic structure; friable; few roots; mildly alkaline; diffuse smooth boundary.

Cg—59 to 75 inches; very dark gray (10YR 3/1) silty clay loam; weak coarse prismatic structure; firm; few roots; matrix is gray (5Y 4/1) at a depth of more than 75 inches; becomes more loamy with increasing depth; mildly alkaline.

Lawson soils are silt loam and less commonly silty clay loam to a depth of 40 inches or more. In some areas, thin lenses of silt or very fine sand are between depths of 30 and 40 inches.

The A horizon typically ranges from 24 to 60 inches in thickness. It has color value of 2 or 3 and chroma of 1 or 2. It ranges from slightly acid to mildly alkaline.

Martinsville series

This series consists of well drained soils that have moderate permeability. These soils formed in stratified loamy material on outwash plains. They formed under woods. Slope ranges from 0 to 15 percent.

Martinsville soils are similar to Miami soils and are near Fayette, Miami, Selma, and St. Charles soils. Selma soils are poorly drained. Fayette and St. Charles soils have less sand in the solum. Miami soils lack stratification in the lower part of the solum.

Typical pedon from an area of Martinsville silt loam, 0 to 2 percent slopes, on an outwash plain about 3 miles southeast of Lindenwood, 350 feet north and 269 feet west of southeast corner of sec. 16, T. 41 N., R. 2 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) silt loam, gray (10Y 6/1) dry; moderate very fine and fine granular structure; friable; common roots; some sand grains present; slightly acid; clear smooth boundary.

A21—4 to 7 inches; mixed dark gray (10YR 4/1) and brown (10YR 5/3) silt loam, light gray (10YR 7/1) and white (10YR 8/1) dry; strong thin platy structure; friable; common roots; medium acid; clear smooth boundary.

A22—7 to 11 inches; brown (10YR 5/3) silt loam, mixed light yellowish brown (10YR 6/4) and white (10YR 8/1) dry; moderate thin and medium platy structure; friable; common roots; slightly acid; clear smooth boundary.

B1t—11 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

B21t—14 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB22t—21 to 26 inches; yellowish brown (10YR 5/6) clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin discontinuous brown (10YR 4/3) and grayish brown (10YR 5/2) clay films on faces of peds; strongly acid; clear smooth boundary.

IIB23t—26 to 36 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very friable; few roots; thin discontinuous brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated sand grains on faces of peds; medium acid; clear smooth boundary.

IIB3t—36 to 47 inches; yellowish brown (10YR 5/6) sandy loam; weak medium prismatic structure parting to weak coarse subangular blocky; very friable; few roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; at a depth of 45 to 47 inches, matrix is dark yellowish brown (10YR 4/4) with some yellowish brown (10YR 5/6) there is no evidence of clay films, and structure is layered or platy; slightly acid; abrupt smooth boundary.

IIC1—47 to 53 inches; mottled yellowish brown (10YR 5/6), gray (5Y 5/1), strong brown (7.5YR 5/6), and dark brown (10YR 3/3) clay loam; massive; firm; few roots; many pebbles; few fine dark concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

IIC2—53 to 60 inches; gray (5Y 6/1) silt loam; few fine prominent yellowish brown (10YR 5/4 and 5/6) mottles; massive, firm; few roots; very dark brown (10YR 2/2) dendritic root channels; mildly alkaline; abrupt smooth boundary.

The solum ranges from 36 to 60 inches in thickness. Coarse fragments are mixed throughout the solum and range from none to 10 percent, by volume. The C horizon ranges from slightly acid to mildly alkaline.

The A1 horizon has color value of 3 or 4 and chroma of 1 through 4. The Ap horizon, where present, has color value of 4 or 5 and chroma of 2 through 4. It is commonly loam or silt loam and less commonly fine sandy loam or sandy loam. The IIB2 horizon has hue of 10YR, 7.5YR, and less commonly 5YR; value of 4 through 6; and chroma of 3 through 6. The IIB2 horizon is commonly clay loam, but in some pedons, subhorizons are loam, sandy clay loam, silty clay loam, or sandy loam.

Miami series

This series consists of well drained soils that have moderate permeability. These soils formed in glacial outwash or wind worked deposits over calcareous glacial till. They formed under forest vegetation on uplands. Slope ranges from 2 to 20 percent.

Miami soils are similar to and are near Martinsville, Pecatonica, Whalan, and Woodbine soils. In Martinsville soils, the solum is more than 40 inches thick. Pecatonica soils have redder hues in at least one subhorizon of the subsoil. Whalan and Woodbine soils have more clay in the lower part of the solum and are underlain by limestone and dolomite bedrock.

Typical pedon from an area of Miami loam, 5 to 10 percent slopes, eroded, on the side of an upland ridge about 4 miles northeast of Grand Detour, 1,733 feet north and 413 feet west of southeast corner of sec. 4, T. 22 N., R. 9 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) mixed with some dark yellowish brown (10YR 4/4) loam, light brownish gray (10YR 6/2) dry; moderate fine and medium granular structure; friable; many roots; neutral; abrupt smooth boundary.

B21t—8 to 15 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—15 to 22 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; 1 percent pebbles; medium acid; clear smooth boundary.

B23t—22 to 28 inches; dark brown (7.5YR 4/4) clay loam; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 2 percent pebbles; slightly acid; clear smooth boundary.

B3t—28 to 34 inches; dark yellowish brown (10YR 4/4) clay loam; weak fine prismatic structure parting to weak coarse subangular blocky; friable; few roots; thin patchy dark brown (10YR 3/3) clay films on faces of peds; 5 percent pebbles; neutral; clear smooth boundary.

C—34 to 60 inches; yellowish brown (10YR 5/4) loam; massive; friable; 7 percent pebbles; strong effervescence; moderately alkaline.

The solum ranges from 24 to 42 inches in thickness. The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. It typically is loam, but it is silt loam, fine sandy loam, and sandy loam in places. The B2 horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. It commonly is clay loam, but individual horizons are loam, sandy clay loam, silty clay loam, or sandy loam in places. The most acid part of the B2 horizon is medium acid or strongly acid, but individual horizons are neutral or slightly acid in places.

Millbrook series

This series consists of somewhat poorly drained soils that have moderate permeability or moderately slow permeability. These soils formed in loess covered outwash plains under prairie grass and widely spaced trees. These soils have a somewhat grayer color than is defined as the range of the series, but this does not alter the use or behavior of the soils.

Millbrook soils are similar to Kendall soils and are near Atkinson, Drummer, Jasper, and Sidell soils. Kendall soils have less sand in the solum and do not have a mollic surface layer. Atkinson, Jasper, and Sidell soils have better natural drainage. Drummer soils have poor natural drainage.

Typical pedon from an area of Millbrook silt loam on a loess covered outwash plain about 2 miles southwest of Kings, 857 feet south and 29 feet west of northeast corner of sec. 32, T. 41 N., R. 1 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; many roots; lower 1 inch of horizon has moderate very fine and fine platy structure and has few fine faint grayish brown (10YR 5/2) and dark brown (10YR 4/3) mottles; neutral; abrupt smooth boundary.

A2—7 to 12 inches; grayish brown (10YR 5/2) mixed with some dark grayish brown (10YR 4/2) silt loam; common fine distinct yellowish brown (10YR 5/6) and common fine prominent strong brown (7.5YR 5/6) mottles; moderate fine and medium platy structure; friable; common roots; common very dark gray (10YR 3/1) root channel linings; neutral; clear smooth boundary.

B1—12 to 19 inches; grayish brown (10YR 5/2) silty clay loam; many fine distinct yellowish brown (10YR 5/4 & 5/6) mottles; weak medium and coarse subangular blocky structure; friable; few roots; neutral clear smooth boundary.

B21t—19 to 27 inches; grayish brown (10YR 5/2) silty clay loam; many fine distinct yellowish brown (10YR 5/4 & 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few roots; moderate continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

IIB22t—27 to 33 inches; grayish brown (10YR 5/2) clay loam; many fine distinct yellowish brown (10YR 5/4 & 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few roots; moderate continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

IIB23t—33 to 37 inches; mottled yellowish brown (10YR 5/4 & 5/6) strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; moderate discontinuous dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

IIB31t—37 to 44 inches; mottled yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; thin patchy dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); slightly acid; clear smooth boundary.

IIB32t—44 to 55 inches; mottled yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) sandy loam; weak coarse subangular blocky structure; friable; thin patchy dark grayish brown clay films on faces of peds; slightly acid; clear smooth boundary.

IIC—55 to 64 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; friable; 10 percent pebbles; slightly acid.

The solum ranges from 36 inches to more than 60 inches in thickness.

The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The IIB2 horizon that formed in outwash is silt loam, loam, sandy loam, sandy clay loam, or clay loam.

Millington series

This series consists of poorly drained soils that have moderate permeability. These soils formed in stratified alluvium and under marsh and prairie vegetation on flood plains. Slope ranges from 0 to 3 percent.

Millington soils are similar to Canisteo soils and are near Du Page, Lawson, Sawmill, and Selma soils. Canisteo soils have a thinner mollic epipedon. Du Page soils have better natural drainage. Lawson and Sawmill soils have a silty solum and are noncalcareous. Selma soils do not have a cumulic surface layer and are noncalcareous.

Typical pedon from an area of Millington silt loam on the Rock River flood plain about 2 miles south of Oregon, 248 feet south and 2,640 feet east of northwest corner of sec. 21, T. 23 N., R. 10 E.

A1—0 to 19 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) rubbed, gray (10YR 5/1) dry; moderate fine granular structure; friable; common roots; some sand grains; slight effervescence; moderately alkaline; gradual smooth boundary.

B2—19 to 38 inches; very dark gray (10YR 3/1) loam; gray (10YR 5/1) dry; weak fine and very fine subangular blocky structure; friable; few roots; few visible snail shells; violent effervescence; moderately alkaline; gradual smooth boundary.

C1g—38 to 53 inches; dark gray (10YR 4/1) with some very dark gray (10YR 3/1) loam; few fine distinct yellowish brown (10YR 5/4) and dark brown (10YR 4/3) mottles; massive; some weak very coarse prismatic structure in upper part of horizon; friable; few roots; few visible snail shells; sand content increases with depth; strong effervescence; moderately alkaline; gradual smooth boundary.

C2g—53 to 61 inches; stratified dark gray (10YR 4/1) yellowish brown (10YR 5/4) and dark brown (10YR 4/3) sandy loam and loamy sand; massive; friable; common broken snail shells; violent effervescence; moderately alkaline.

The solum ranges from 24 to 40 inches in thickness. In some pedons, the mollic epipedon is made up of the A horizon. In others, the mollic epipedon extends into the B horizon.

The A horizon typically has a color value of 2 or 3 and chroma of 1 or 2. It is commonly loam or silt loam but is silty clay loam or clay loam in places. Thin strata of gravel are in some pedons. The B horizon has color value of 2 or 3 and chroma of 1 or 2.

Muscatine series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in loess on uplands. They formed under prairie vegetation. Slope ranges from 0 to 3 percent. This soil has an argillic horizon, which is not definitive for the Muscatine series. This difference does not alter the use or behavior of the soils.

Muscatine soils are similar to Elburn soils and are near Drummer, Sable, and Tama soils. Elburn soils formed in loess and glacial outwash. Drummer and Sable soils are poorly drained. In addition, Drummer soils formed in loess and glacial outwash. Tama soils have better natural drainage than Muscatine soils.

Typical pedon from an area of Muscatine silt loam on an upland flat about 1/2 mile west and 1/2 mile south of Baileyville, 1,380 feet west and 580 feet south of center of sec. 5, T. 25 N., R. 8 E.

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate, fine and medium granular structure; friable; common roots; layer compacted because of agricultural practices; neutral; abrupt smooth boundary.

A12—7 to 16 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common roots; medium acid; clear smooth boundary.

B1t—16 to 22 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure parting to moderate fine and very fine granular; friable; common roots; thin continuous very dark gray (10YR 3/1) clay films on faces of peds; medium acid; clear smooth boundary.

B21t—22 to 31 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—31 to 41 inches; grayish brown (10YR 5/2) silty clay loam; few fine prominent strong brown (7.5YR 5/6) mottles; weak medium and coarse prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; many fine dark concretions (iron and manganese oxides); neutral; gradual smooth boundary.

B3t—41 to 50 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; friable; few roots; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; many fine dark concretions (iron and manganese oxides); some root channel fillings; neutral; gradual smooth boundary.

C—50 to 60 inches; mottled yellowish brown (10YR 5/6) olive (5Y 5/3) and light olive gray (5Y 6/2) silt loam; massive; friable; some fine dark concretions (iron and manganese oxides); some vertical cleavage visible; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The A horizon is commonly 14 to 20 inches thick. It is silty clay loam or silt loam. The B horizon has color value of 4 through 6 and chroma of 2 through 4. Clay films have a value of 3 or 4 and chroma of 1 to 3.

Myrtle series

This series consists of well drained soils that have moderate permeability. These soils formed in 30 to 50 inches of loess and reddish colored buried soils. They formed under mixed prairie and forest vegetation on glacial till plains and moraines. Slope ranges from 2 to 5 percent.

Myrtle soils are similar to Downs, Flagg, and Ogle soils and are near Downs, Fayette, and Tama soils. Flagg soils do not have a mollic surface layer and have a more pronounced A2 horizon. Ogle soils have a thicker mollic surface layer. Downs, Fayette, and Tama soils formed entirely in loess and have less sand in the lower part of the solum.

Typical pedon from an area of Myrtle silt loam, 2 to 5 percent slopes, on an upland till plain about 3 1/2 miles north and 1 mile east of Byron, 1,630 feet east and 245 feet north of southwest corner of sec. 9, T. 25 N., R. 11 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) mixed with some yellowish brown (10YR 5/4) silt loam, brown (10YR 5/3) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of tillage; strongly acid; abrupt smooth boundary.

B1—7 to 12 inches; dark brown (10YR 4/3) mixed with some yellowish brown (10YR 5/4) silty clay loam; moderate very fine and fine subangular blocky structure; friable; common roots; medium acid; clear smooth boundary.

B21t—12 to 22 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine prismatic structure parting to strong very fine and fine subangular blocky; friable; common roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B22t—22 to 27 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine prismatic structure parting to strong fine and medium subangular blocky; friable; common roots; thin continuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; very strongly acid; clear smooth boundary.

B23t—27 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; common roots; thin continuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides); very strongly acid; clear smooth boundary.

IIB24t—32 to 39 inches; mixed dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/4) loam; weak coarse prismatic structure; friable; few roots; thin continuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides); 19 percent pebbles; very strongly acid; clear smooth boundary.

IIB25t—39 to 60 inches; yellowish red (5YR 4/6) sandy clay loam; weak coarse prismatic structure; friable; thin patchy dark reddish brown (5YR 3/4) clay films on faces of peds; 5 percent pebbles; strongly acid.

The solum commonly is 5 feet or more thick. It typically is medium acid to very strongly acid, but in some pedons, it ranges to neutral.

The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The part of the B2t horizon that formed in loess has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3, 4, or 5. The IIB horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR; value of 4, 5, or 6; and chroma of 4, 5, or 6. The IIB horizon ranges from silty clay loam that has some sand to loam, clay loam, or sandy clay loam.

Ockley series

This series consists of well drained soils that have moderate permeability in the solum and very rapid permeability in the substratum. These soils formed in thin loess and loamy glacial drift overlying calcareous sand and gravel. They formed under forest vegetation on outwash plains and stream terraces. Slope ranges from 0 to 5 percent.

Ockley soils are similar to Martinsville soils and are near Fox, Lamont, and Martinsville soils. Lamont and Martinsville soils do not have gravel in the lower part of the solum and in the underlying material. Fox soils have stratified sand and gravel at a depth of less than 40 inches.

Typical pedon from an area of Ockley silt loam, 2 to 5 percent slopes, on a terrace about 1/2 mile west of Byron, 1,815 feet south and 29 feet west of northeast corner of sec. 36, T. 25 N., R. 10 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B1t—9 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin patchy dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB21t—15 to 22 inches; dark brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB22t—22 to 31 inches; dark brown (7.5YR 4/4) clay loam; moderate medium and coarse subangular blocky structure; friable; few roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent pebbles; medium acid; clear smooth boundary.

IIB23t—31 to 37 inches; dark brown (7.5YR 4/4) clay loam; weak medium and coarse subangular blocky structure; friable; few roots; thin patchy dark brown (10YR 4/3) clay films on faces of peds; about 15 percent pebbles; slightly acid; clear smooth boundary.

IIB24t—37 to 43 inches; dark brown (7.5YR 4/4) gravelly clay loam; weak coarse subangular blocky structure; friable; few roots; thin patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB25—43 to 55 inches; dark brown (7.5YR 3/2 & 4/4) gravelly clay loam; weak coarse subangular blocky structure; friable; slightly acid; clear wavy boundary.

IIC—55 to 60 inches; yellowish brown (10YR 5/4) sand and gravel; single grained; loose; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 60 inches and is the same as depth to calcareous sand and gravelly sand. The upper part of the solum ranges from 0 to 15 percent coarse fragments and the lower part from 18 to 40 percent, by volume.

The Ap horizon typically has color value of 4 or 5 and chroma of 2 through 6. It is silt loam or loam. The IIB2 horizon commonly has hue of 10YR through 5YR, value of 4 or 5, and chroma of 3 through 6. The lower part of the IIB2 horizon near the contact with the IIIC horizon ranges through value and chroma of 2 or 3. Typically the IIB2 horizon is clay loam, gravelly clay loam, or gravelly sandy clay loam. The upper part of the IIB horizon ranges from medium acid to very strongly acid and acidity decreases gradually as depth increases.

Odell series

This series consists of somewhat poorly drained soils that have moderately slow permeability. These soils formed in loamy calcareous glacial till under prairie vegetation on till plains. Slope ranges from 0 to 3 percent.

Odell soils are near La Hogue, Parr, and Selma soils. La Hogue soils have a thicker solum. Parr soils are well drained. Selma soils are poorly drained.

Typical pedon from an area of Odell loam on a till plain about 6 miles east of Grand Detour, 2,475 feet south and 141 feet west of northeast corner of sec. 11, T. 22 N., R. 10 E.

Ap—0 to 8 inches; black (10YR 2/1) loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; few roots; layer compacted because of tillage; many sand grains; slightly acid; abrupt smooth boundary.

A12—8 to 13 inches; black (10YR 2/1) loam; dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; few roots; medium acid; clear smooth boundary.

B1t—13 to 19 inches; mixed very dark grayish brown (10YR 3/2) and dark grayish brown (10YR 4/2) clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous very dark gray (10YR 3/1) clay films on faces of peds; neutral; clear smooth boundary.

B2t—19 to 25 inches; olive brown (2.5Y 4/4) clay loam; moderate fine and medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin discontinuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; mildly alkaline; clear smooth boundary.

C1—25 to 30 inches; mottled light olive brown (2.5Y 5/4) grayish brown (2.5Y 5/2) and olive yellow (2.5Y 6/6) loam; weak coarse prismatic structure; friable; few roots; many pebbles; slight effervescence; moderately alkaline; clear smooth boundary.

C2—30 to 60 inches; mottled light olive brown (2.5Y 5/4 and 5/6) and light brownish gray (2.5Y 6/2) loam; massive; friable; many pebbles; strong effervescence; moderately alkaline.

The solum ranges from 20 to 42 inches in thickness. Carbonates are at a depth ranging from 20 to 40 inches.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. It typically is loam or silt loam. The B horizon has color value of 4 through 6 and chroma of 2 through 4, and some pedons have gray mottles with value of 4 or more and chroma of 2 or less. The B2 horizon typically is loam or clay loam, but some pedons have some thin horizons of silty clay loam. The C horizon is commonly loam or clay loam and less commonly sandy loam or silt loam that is high in content of sand.

Ogle series

This series consists of well drained soils that have moderate permeability. These soils formed in 30 to 50 inches of loess and reddish colored buried soils. They formed under prairie vegetation on glacial till plains. Slope ranges from 2 to 10 percent. This soil is less acid throughout the solum, and the decrease in clay in the lower part of the subsoil is less than is defined as the range of the series. These differences do not alter the use or behavior of this soil.

Ogle soils are similar to and are near Catlin, Durand, Plano, and Tama soils. Catlin, Plano, and Tama soils do not have reddish colored glacial till in the solum. In Durand soils, the upper 20 inches of the Bt horizon is more than 15 percent fine or coarser than fine, sand.

Typical pedon from an area of Ogle silt loam, 2 to 5 percent slopes, on an upland till plain about 2 miles east of Kings, 1,203 feet east and 454 feet south of northwest corner of sec. 25, T. 41 N., R. 1 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam; grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A3—7 to 11 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (10YR 4/4) silt loam; brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; common roots; slightly acid; clear smooth boundary.

B21t—11 to 16 inches; dark brown (10YR 4/3) silty clay loam; weak fine prismatic structure parting to moderate very fine and fine subangular blocky; friable; common roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; some very dark gray (10YR 3/1) root channel fillings; neutral; clear smooth boundary.

B22t—16 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine prismatic structure parting to moderate very fine and fine subangular blocky; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; neutral; clear smooth boundary.

B23t—23 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; neutral; clear smooth boundary.

B31t—32 to 43 inches; yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; thin patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; neutral; gradual smooth boundary.

IIB32t—43 to 50 inches; reddish brown (5YR 4/4) loam; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; thin discontinuous reddish brown (5YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

IIB33t—50 to 55 inches; mixed reddish brown (5YR 4/4) and yellowish red (5YR 4/6) clay loam; moderate medium prismatic structure; firm; thin discontinuous (5YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

IIB34t—55 to 65 inches; yellowish red (5YR 5/6) clay loam; weak coarse prismatic structure; firm; thin discontinuous reddish brown (5YR 4/3 and 4/4) clay films on faces of peds; many noticeable sand grains; neutral; clear smooth boundary.

The solum commonly is 5 feet or more thick. It is neutral to strongly acid.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 4, or 5. The IIB horizon has hue of 2.5YR, 5YR, or less commonly 7.5YR; value of 4, 5, or 6; and chroma of 4, 5, or 6. The IIB horizon ranges from silty clay loam and some sand to loam, clay loam, or sandy clay loam.

Orion series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in 20 to 40 inches of recently deposited silty alluvium over older silty alluvium. They formed on floodplains. Slope ranges from 0 to 3 percent.

Orion soils are near Comfrey, Martinsville, Radford, and Sawmill soils. Comfrey, Radford, and Sawmill soils have a mollic surface layer. Martinsville soils have a thinner surface layer and have more sand in the solum than the Orion soils.

Typical pedon from an area of Orion silt loam on a flood plain about 3 1/2 miles north of Oregon, 427 feet east and 367 feet north of center of sec. 21, T. 24 N., R. 10 E.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) mixed with some very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak thin platy structure parting to weak fine subangular blocky; friable; common roots; mildly alkaline; clear smooth boundary.

C—7 to 27 inches; stratified very dark grayish brown (10YR 3/2) and grayish brown (10YR 5/2) mixed with some pale brown (10YR 6/3) silt loam; few moderate distinct yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; common roots; lenses are more pronounced in lower half of horizon; mildly alkaline; abrupt smooth boundary.

A11b—27 to 34 inches; very dark gray (10YR 3/1) silt loam; weak medium subangular blocky structure parting to weak medium granular; friable; few roots; mildly alkaline; clear smooth boundary.

A12b—34 to 47 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine and medium subangular blocky structure; friable; few roots; upper 6 inches of horizon contains lenses and is platy; light gray (10YR 7/1) uncoated silt grains on faces of peds; mildly alkaline; clear smooth boundary.

C1—47 to 59 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine prominent strong brown (7.5YR 5/8) iron stain mottles; moderate fine and medium prismatic structure; friable; common uncoated silt grains on faces of peds; common fine dark accumulations (iron and manganese oxides); mildly alkaline; clear smooth boundary.

C2—59 to 69 inches; grayish brown (2.5Y 5/2) silt loam grading to loam as depth increases; few fine distinct light olive brown (2.5Y 5/6) and common medium prominent yellowish red (5YR 4/8) mottles; weak coarse prismatic structure; friable; very dark gray (10YR 3/1) root channel fillings present; several sandy lenses; few fine dark accumulations (iron and manganese oxides); organic clay accumulations at a depth of 68 inches; mildly alkaline.

The buried Ab horizon is at a depth ranging from 20 to 40 inches. The soil ranges from mildly alkaline to medium acid.

The stratified colors in the upper 20 to 40 inches are caused by the recently deposited sediment rather than

by gley characteristics resulting from poor drainage. Color, arrangement, and thickness of all horizons is quite variable principally as a result of the source of the sediment and the method of deposition. The Ab horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. In some pedons, the Ab horizon has high chroma mottles. The C horizon is 5 to 20 percent, by volume, sand, chert, or gravel.

Palsgrove series

This series consists of well drained soils that have moderate permeability in the upper part of the solum and very slow permeability in the lower part. These soils formed in 35 to 50 inches of loess and in a thin layer of residuum of limestone and dolomite bedrock. They formed under forest vegetation on bedrock uplands. Slope ranges from 2 to 15 percent.

Palsgrove soils are similar to and are near Fayette, Flagg, St. Charles, and Whalan soils. None of these, except Whalan soils, has a solum terminated by limestone or dolomite bedrock. Whalan soils have more sand in the solum and are terminated by limestone bedrock at a depth of less than 40 inches.

Typical pedon from an area of Palsgrove silt loam, 2 to 5 percent slopes, on a loess covered bedrock upland about 4 miles north of Grand Detour, 2,355 feet south and 275 feet east of center of sec. 24, T. 23 N., R. 9 E.

Ap—0 to 10 inches; mixed dark grayish brown (10YR 4/2) and dark brown (10YR 3/3) silt loam; pale brown (10YR 6/2) dry; moderate fine and medium granular structure; friable; common roots; few peds with very weak platy structure from disturbed, former A2 horizon; slightly acid; abrupt smooth boundary.

B21t—10 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B22t—17 to 28 inches; mixed yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 4/3 & 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B23t—28 to 35 inches; mixed yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; moderate discontinuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B24t—35 to 48 inches; mixed yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) silty clay loam; moderate coarse prismatic structure; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

IIB25t—48 to 54 inches; mixed reddish brown (5YR 4/4), yellowish red (5YR 4/6), and yellowish brown (10YR 5/6) clay; moderate coarse prismatic structure; friable; few roots; moderate discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; some dark gray (10YR 4/1) root channels; neutral; clear smooth boundary.

IIB26t—54 to 59 inches; mixed reddish brown (5YR 4/4) and yellowish brown (10YR 5/8) clay; moderate coarse prismatic structure; friable; few roots; moderate discontinuous very dark gray (10YR 3/1) and dark brown (7.5YR 4/4) clay films on faces of peds; some small rock fragments; neutral; abrupt wavy boundary.

IIR—59 inches; yellow (10YR 7/8) fractured and disintegrated bedrock.

The solum typically is 40 to 60 inches thick. The residual material commonly is 2 to 12 inches thick, but in some pedons, it ranges to 2 feet or more. Limestone and dolomite bedrock commonly is between depths of 40 and 60 inches, but it is at a greater depth in pedons with thick layers of residuum.

The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. The B horizon that formed in loess has hue of 10YR and less commonly 7.5YR, value of 4 or 5, and chroma of 3 or 4. The IIB horizon that formed in residuum weathered from limestone has hue of 5YR, 2.5YR, or less commonly 7.5YR or 10YR; value 3 through 5; and chroma of 3 through 5. It contains variable amounts of chert and, in some pedons, weathered bedrock fragments.

Parr series

This series consists of well drained soils that have moderate permeability. These soils formed in loamy, calcareous glacial till. They formed under prairie vegetation on till plains. Slope ranges from 2 to 10 percent.

Parr soils are similar to and are near Griswold, Jasper, La Hogue, and Varna soils. Griswold soils are underlain by sandy loam till. Jasper soils have a solum that is more than 40 inches thick. La Hogue soils are somewhat poorly drained. Varna soils have more clay in the solum.

Typical pedon from an area of Parr loam, 2 to 5 percent slopes, on a till plain (fig. 12) about 1 mile west and 1/2 mile north of Chana, 260 feet west and 74 feet north of southeast corner of sec. 8, T. 23 N., R. 11 E.

Figure 12.—Roadcut showing glacial till subsoil of Parr loam, 2 to 5 percent slopes.

Ap—0 to 7 inches; very dark brown (10YR 2/2) loam; dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

A3—7 to 12 inches; mixed very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) loam; grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common roots; medium acid; clear smooth boundary.

B21t—12 to 18 inches; brown (10YR 4/3) clay loam; moderate 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.

B22t—18 to 29 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; few roots; thin discontinuous brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

C—29 to 60 inches; mixed yellowish brown (10YR 5/4 & 5/6) loam; massive; friable; few roots; 4 percent pebbles; slight effervescence, moderately alkaline.

The thickness of the solum ranges from 24 to 42 inches and commonly is the same as depth to carbonates. In places, a layer of loess as much as 18 inches thick is on the surface.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. It is loam, silt loam, or less commonly fine sandy loam. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is commonly clay loam or loam, but subhorizons range to silty clay loam. The C horizon is loam or clay loam.

In map unit 221C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or the behavior of the soil.

Pecatonica series

This series consists of well drained soils that have moderate permeability. These soils formed in loess and in reddish buried soils weathered from glacial drift. They formed under forest vegetation on uplands. Slope ranges from 2 to 15 percent.

Pecatonica soils are similar to and near the Flagg, Kidder, Martinsville, and Miami soils. Flagg soils contain more silt and are deeper to glacial till. Kidder and Miami soils have a thinner solum and are underlain by yellowish colored glacial till. Martinsville soils have a thinner loess layer and have more sand in the upper part of the subsoil.

Typical pedon from an area of Pecatonica silt loam, 2 to 5 percent slopes, on the edge of an upland ridge about 5 1/2 miles northwest of Byron, 2,298 feet west and 897 feet south of northeast corner of sec. 10, T. 25 N., R. 10 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) mixed with some yellowish brown (10YR 5/4) silt loam, light gray (10YR 7/1) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of agricultural practices; neutral; abrupt smooth boundary.

A2—6 to 11 inches; dark yellowish brown (10YR 4/4) silt loam; lower part of horizon has heavier texture; weak thin and medium platy structure; friable; common roots; some very dark grayish brown (10YR 3/2) root channel fillings; slightly acid; clear smooth boundary.

B21t—11 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; common roots; thin continuous dark brown (10YR 4/3) clay films and thin light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B22t—18 to 22 inches; strong brown (7.5YR 5/6) mixed with some yellowish red (5YR 4/6) silty clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; some sand grains visible; very strongly acid; clear smooth boundary.

IIB23t—22 to 33 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; moderate continuous reddish brown (5YR 4/4) clay films and thin very pale brown (10YR 7/3) uncoated grains on faces of peds; some pebbles; very strongly acid; clear smooth boundary.

IIB24t—33 to 44 inches; yellowish red (5YR 5/6) sandy loam; moderate coarse prismatic structure; friable; few roots; moderate discontinuous reddish brown (5YR 4/4) clay films on faces of peds; some pebbles; very strongly acid; clear smooth boundary.

IIB3—44 to 51 inches; yellowish red (5YR 5/6) sandy loam; weak coarse prismatic structure; friable; few roots; some pebbles; a few thin continuous coatings in root channels; very strongly acid; gradual smooth boundary.

IIC—51 to 60 inches; yellowish red (5YR 5/8) sandy loam; massive; friable; few roots; very strongly acid.

The solum ranges from 4 to 8 feet or more in thickness.

In uncultivated areas, the A1 horizon that is less than 5 inches thick has color value of 2 or 3 and chroma of 1 or 2. The A2 horizon has color value of 4 to 6 and chroma of 2 to 4. The upper part of the B horizon is silt loam or silty clay loam. It has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 6. The IIB2 horizon ranges from 7.5YR to 2.5YR in hue. It is commonly sandy loam but it ranges to sandy clay loam, clay loam, or loam. The C horizon is noncalcareous in some pedons where the bedrock is 5 to 8 feet below the surface. Where present, the C horizon ranges from gravelly light sandy loam to sandy loam or loam.

Plano series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess or other silty material and loamy stratified outwash. They formed under prairie vegetation on upland till and outwash plains and stream terraces. Slope ranges from 0 to 10 percent.

Plano soils are similar to Catlin, Ogle, and Tama soils and are near the Elburn, Ogle, and Sidell soils. Catlin soils contain less sand and more clay in the IIB and IIC horizons. Tama soils contain less sand in the lower part of the solum and do not have a IIB horizon. Ogle soils contain more clay in the IIB horizon, which formed from a reddish buried soil. Elburn soils are somewhat poorly drained. Sidell soils contain more sand within a depth of 40 inches.

Typical pedon from an area of Plano silt loam, 2 to 5 percent slopes, on an outwash plain about 2 miles northeast of Monroe Center, 976 feet west and 49 feet south of northeast corner of sec. 15, T. 42 N., R. 2 E.

Ap—0 to 8 inches; very dark gray (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate very fine and fine granular structure; friable; many roots; layer compacted because of tillage; slightly acid; abrupt smooth boundary.

A12—8 to 14 inches; mixed dark brown (10YR 3/3) and very dark grayish brown (10YR 3/2) silt loam; grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; many roots; slightly acid; clear smooth boundary.

B1t—14 to 20 inches; dark brown (10YR 4/3) silty clay loam; moderate very fine and fine subangular blocky structure; friable; common roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B21t—20 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; thin continuous dark brown (10YR 4/3 & 3/3) clay films on faces of peds; few very dark brown (10YR 2/2) root channel fillings present; medium acid; clear smooth boundary.

B22t—28 to 35 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine and medium subangular blocky structure; firm; common roots; thin continuous dark brown (10YR 4/3) and thin patchy dark brown (7.5YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

B23t—35 to 46 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to strong medium and coarse subangular blocky; firm; few roots; thin discontinuous dark brown (7.5YR 4/2) clay films on faces of peds; bright mottles in lower part; medium acid; clear smooth boundary.

IIB3t—46 to 53 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4) loam; common fine distinct yellowish brown (10YR 5/6 & 5/8) and few fine distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; few roots; thin patchy dark accumulations (iron and manganese oxides); slightly acid; clear smooth boundary.

IIC—53 to 62 inches; yellowish brown (10YR 5/4) stratified loam and sandy loam; massive; friable; neutral.

The solum ranges from 44 to 70 inches in thickness. Carbonates are at a depth ranging from 45 to 70 inches.

The A horizon ranges from 10 to 18 inches in thickness. The A1 or Ap horizon has color value of 2 or 3

and chroma of 1 through 3. The B horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 3 or 4. The C horizon is commonly stratified outwash, but in a few pedons, it is sandy loam till.

In map unit 199C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Radford series

This series consists of somewhat poorly drained soils that have moderate permeability. These soils formed in recent, silt loam alluvium, which is 20 to 40 inches thick over an older buried soil. They formed under prairie vegetation and scattered trees on bottom lands. Slope ranges from 0 to 3 percent.

Radford soils are similar to Lawson soils and are near Comfrey, Drummer, Sawmill, and Selma soils. Lawson soils do not have a buried, mollic silty clay loam horizon within a depth of 40 inches. Comfrey, Drummer, Sawmill, and Selma soils are poorly drained.

Typical pedon from an area of Radford silt loam about 1/2 mile east of Kings near Illinois Route 64, 325 feet east and 573 feet south of northwest corner of sec. 26, T. 41 N., R. 1 E.

A11—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate medium granular structure; friable; many roots; mildly alkaline; clear smooth boundary.

A12—8 to 18 inches; very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; common roots; few dark stains (iron and manganese oxides); neutral; clear smooth boundary.

C—18 to 28 inches; very dark gray (10YR 3/1) silt loam; gray (10YR 5/1) dry; thin strata of dark grayish brown (10YR 4/2); weak thin platy structure parting to moderate medium granular; friable; common roots; common fine dark stains (iron and manganese oxides); neutral; abrupt wavy boundary.

A11b—28 to 49 inches; black (N 2/0) silty clay loam; dark gray (N 4/0) dry; moderate medium and coarse subangular blocky structure; friable; few roots; mildly alkaline; gradual smooth boundary.

A12b—49 to 60 inches; black (10YR 2/1) silty clay loam; weak coarse prismatic structure parting to moderate coarse subangular blocky; friable; some sand grains visible; mildly alkaline.

The silt loam upper layer over the buried soil ranges from 20 to 40 inches in thickness.

The A horizon ranges from 10 to 20 inches in thickness. It has color value of 2 or 3 and chroma of 1 or 2. The C horizon is stratified in thin parallel layers. It has color value of 2 through 6 and chroma of 1 or 2. The A and C horizons range from slightly acid to mildly alkaline. The layers of buried soil range from slightly acid to mildly alkaline and are silty clay loam, clay loam, or loam.

Ripon series

The Ripon series consists of well drained soils that have moderate permeability. These soils formed in loess and glacial drift over dolomite bedrock. They formed under prairie vegetation on bedrock uplands. Slope ranges from 2 to 10 percent. This soil has a surface layer that is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Ripon soils are similar to Ashdale, Ogle, Rockton, and Tama soils and are near Ashdale, Ogle, Sogn, and Tama soils. Rockton soils have more sand in the solum. Ashdale, Ogle, and Tama soils do not have limestone or dolomite bedrock at a depth of less than 40 inches. Sogn soils have limestone or dolomite bedrock at a depth of less than 20 inches.

Typical pedon from an area of Ripon silt loam, 5 to 10 percent slopes, eroded, on a bedrock upland about 1 1/2 miles east and 3/4 mile south of Egan, 380 feet west and 819 feet north of southeast corner of sec. 7, T. 25 N., R. 10 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) mixed with some dark brown (10YR 4/3) silt loam; grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

B21t—7 to 14 inches; dark brown (10YR 4/3) silty clay loam; weak fine and medium subangular blocky structure; friable; common roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—14 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium subangular blocky structure, very weak prismatic structure in places; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB23t—24 to 31 inches; dark yellowish brown (10YR 4/4) clay loam; weak coarse subangular blocky structure, weak very prismatic structure in places; friable; few roots; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; lowest 1 inch is reddish brown (5YR 4/4) clay; few pebbles; slightly acid; abrupt wavy boundary.

IIR—31 to 34 inches; brownish yellow (10YR 6/6) weathered dolomite and limestone; hard level bedded dolomite at a depth of 34 inches; strong effervescence; moderately alkaline.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. The loess ranges from 20 to 36 inches in thickness. The underlying glacial till ranges from 1 inch to as much as 10 inches in thickness in places where the solum is thicker. The dark surface layer ranges from 6 to 9 inches in thickness.

The Ap horizon has color value of 2 or 3 and chroma of 1 through 3. The B2t horizon has hue of 10YR or

7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam or silty clay loam. It ranges from slightly acid to strongly acid. The IIB2t horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 3 or 4. It is clay loam, sandy clay loam, or loam. Thin layers of clayey residuum cap the bedrock in some pedons. Coarse fragments in the IIB horizon range to as much as 7 percent, by volume; they are mostly limestone fragments.

Rockton series

This series consists of well drained soils that have moderate permeability. These soils formed in loamy glacial drift and limestone residuum underlain by limestone bedrock at a depth of 20 to 40 inches. They formed under prairie vegetation on uplands. Slope ranges from 2 to 10 percent.

Rockton soils are similar to Atkinson, Jasper, and Parr soils and are near Atkinson, Dickinson, Jasper, and Parr soils. These soils do not have bedrock within a depth of 40 inches.

Typical pedon from an area of Rockton silt loam, 2 to 5 percent slopes, on bedrock uplands about 2 1/2 miles southwest of Kings, 1,409 feet west and 690 feet north of southeast corner of sec. 32, T. 41 N., R. 1 E.

Ap—0 to 7 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; moderate very fine and fine granular structure; friable; common roots; noticeable sand grains; neutral; abrupt smooth boundary.

A12—7 to 16 inches; black (10YR 2/1) with some dark brown (10YR 3/3) silt loam, gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; common roots; noticeable sand grains; slightly acid; clear smooth boundary.

A3—16 to 22 inches; mixed very dark gray (10YR 3/1) and dark brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; few roots; slightly acid; clear smooth boundary.

B2t—22 to 27 inches; brown (10YR 4/3) clay loam; moderate fine and medium subangular blocky structure; friable; few roots; thin discontinuous very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

IIB22t—27 to 29 inches; dark yellowish brown (10YR 4/4) clay; moderate medium rectangular blocky structure; firm; thin discontinuous very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

IIR—29 inches; dolomite bedrock, weathered along joints and partly fractured in upper few inches.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. The A horizon and the upper part of the B horizon typically range from strongly acid through slightly acid, and the IIB horizon ranges from medium acid through neutral.

The dark colored surface layer ranges from 10 inches to more than 22 inches in thickness. The A horizon has color value of 2 or 3 and chroma of 1 or 2. It typically is silt loam, but it is loam and sandy loam in places. The B horizon has 10YR hue in the upper part and 10YR, 7.5YR, or 5YR in the lower part. It has value of 4 or 5 and chroma of 3 or 4. The B horizon is loam, sandy clay loam, clay loam, or clay.

In map unit 503C2, the surface layer is thinner than is defined as the range for the series. This does not alter the use or behavior of the soil.

Rodman series

This series consists of excessively drained soils that have very rapid permeability. These soils formed in calcareous sand and gravel. They formed under prairie grasses and trees on moraines. Slope ranges from 8 to 25 percent. These soils do not have a B horizon and are coarser textured than is defined for the series, but this difference does not alter the use or behavior of the soils.

Rodman soils are near Fox, Jasper, and Warsaw soils. Fox and Warsaw soils are deeper to sand and gravel. Jasper soils have more clay and less sand in the solum, and they also have a much thicker solum than Rodman soils.

Typical pedon of Rodman gravelly loam from an area of Rodman-Fox complex, 12 to 20 percent slopes, on a kame terrace near Kilbuck Creek, about 2 miles east and 3 miles north of Davis Junction, 1,650 feet west and 2,640 feet south of corner of sec. 1, T. 42 N., R. 1 E.

A1—0 to 8 inches; very dark brown (10YR 2/2) gravelly loam, very dark grayish brown (10YR 3/2) dry; a few individual tongues are as much as 17 inches thick; moderate very fine and fine granular structure; very friable; many roots; 22 percent pebbles, slight effervescence; mildly alkaline; abrupt irregular boundary.

C1—8 to 15 inches; mixed yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) very gravelly coarse sand; single grained; loose; few roots; pebbles range up to 4 inches in diameter; 53 percent pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

C2—15 to 20 inches; dark brown (7.5YR 4/4) very gravelly loamy coarse sand; single grained; loose; few roots; many pebbles range up to 4 inches in diameter; 68 percent pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

C3—20 to 60 inches; stratified brownish yellow (10YR 6/6), yellowish brown (10YR 5/6), dark brown (10YR 4/3), and dark yellowish brown (10YR 4/4) gravelly coarse sand; single grained; loose; many pebbles range up to 4 inches in diameter; 23 per-

cent pebbles; strong effervescence; moderately alkaline.

The solum ranges from about 8 to 15 inches in thickness. It typically is neutral to moderately alkaline.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is gravelly loam or gravelly sandy loam. Where present, the B horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 3 or 4. The C horizon generally is stratified sand and gravel.

Ross series

This series consists of well drained soils that have moderate permeability. These soils formed in loamy alluvium under prairie and forest vegetation. They are on flood plains and low terraces. Slope ranges from 0 to 3 percent.

Ross soils are similar to Du Page and Huntsville soils and are near Comfrey, Du Page, Jasper, and Plano soils. Huntsville soils have less sand in the solum. Comfrey soils are poorly drained. Du Page soils are calcareous throughout the solum. Jasper and Plano soils have a noncumulic surface layer.

Typical pedon from an area of Ross loam on the Rock River Terrace about 2 1/2 miles north of Oregon, 1,237 feet east and 2,145 feet south of the northwest corner of sec. 22, T. 24 N., R. 10 E.

Ap—0 to 7 inches; black (10YR 2/1) loam; dark gray (10YR 4/1) dry; moderate fine and very fine granular structure; friable; common roots; mildly alkaline; abrupt smooth boundary.

A12—7 to 21 inches; very dark gray (10YR 3/1) loam; gray (10YR 5/1) dry; moderate fine granular structure; friable; common roots; neutral; gradual smooth boundary.

A13—21 to 32 inches; very dark grayish brown (10YR 3/2) loam; grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few roots; neutral; gradual smooth boundary.

B21—32 to 39 inches; dark brown (10YR 3/3) loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few roots; few earthworm channels; neutral; clear smooth boundary.

B22—39 to 50 inches; dark brown (10YR 4/3) loam; weak medium and coarse prismatic structure; friable; few roots; neutral; clear smooth boundary.

C—50 to 63 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; sandy at bottom of horizon; neutral.

The solum typically ranges from 24 to 50 inches in thickness.

The surface layer has color value of 2 or 3 and chroma of 1, 2, or 3. It is sandy loam, fine sandy loam, loam, or silty loam. In some pedons, it has sufficient coarse fragments for gravelly analogs. The B horizon is loam or silt loam. Reaction dominantly ranges from slightly acid to mildly alkaline; some pedons are weakly calcareous throughout or in the lower part of the solum. The C horizon is sandy loam, loam, silt loam, sandy clay loam, silty clay loam, or clay loam.

Rozetta series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in loess under forest vegetation. They are on ridgetops and side slopes. Slope ranges from 0 to 3 percent.

Rozetta soils are similar to and are near Birkbeck, Fayette, Flagg, and St. Charles soils. Fayette soils do not have mottles to a depth of 30 inches and are well drained. Birkbeck, Flagg, and St. Charles soils contain more sand in the lower part of the B horizon and are underlain by glacial drift.

Typical pedon from an area of Rozetta silt loam, 0 to 3 percent slopes, on a loess covered upland about 2 miles northwest of Mt. Morris, 921 feet east and 59 feet south of northwest corner of sec. 21, T. 24 N., R. 9 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; light brownish gray (10YR 6/2) dry; fine and fine granular structure; friable; few roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A2—8 to 12 inches; dark brown (10YR 4/3) silt loam; weak thin platy structure parting to moderate fine granular; friable; few roots; few dark grayish brown (10YR 4/2) root channel fillings; neutral; clear smooth boundary.

B1t—12 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; friable; few roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

B21t—17 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; few roots; thin continuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B22t—23 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

B23t—28 to 34 inches; mottled yellowish brown (10YR 5/4 & 5/6) brown (10YR 5/3) and grayish brown (10YR 5/2) silty clay loam; moderate medium prismatic structure parting to strong medium and coarse subangular blocky; friable; common roots; thin dis-

continuous brown (10YR 5/3) clay films on faces of peds; many fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

B3—34 to 49 inches; mottled dark yellowish brown (10YR 4/4) and light olive brown (2.5Y 5/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and few medium prominent light brownish gray (2.5Y 6/2) mottles; friable; few roots; many fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

C—49 to 60 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; massive; firm; common roots; few vertical cleavage planes present; few fine dark accumulations (iron and manganese oxides); medium acid.

The solum ranges from 42 to 60 inches in thickness. The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. The A2 horizon has color value of 4 through 6 and chroma of 2 or 3. The B horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. The lower part of the Bt horizon is mottled with color value of 4 through 6 and chroma of 2 through 6. The C horizon commonly ranges from medium acid to neutral in the upper part and typically contains free carbonates at a depth of more than 5 or 6 feet.

Sable series

This series consists of poorly drained soils that have moderate permeability. These soils formed in loess on uplands. They formed under marsh and sedge vegetation. Slope ranges from 0 to 2 percent.

Sable soils are similar to Drummer soils and are near Elburn, Muscatine, Sawmill, and Stronghurst soils. Drummer soils formed in loess and glacial outwash. Elburn, Muscatine, and Stronghurst soils are somewhat poorly drained and occupy a higher position on the landscape. Sawmill soils have a dark colored cumulic surface layer.

Typical pedon from an area of Sable silty clay loam about 1/2 mile west and 1/2 mile south of Baileyville, 1,380 feet west and 1,015 feet south of center of sec. 5, T. 25 N., R. 8 E.

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; fine and medium granular structure; friable; common roots; layer compacted because of tillage; abrupt smooth boundary.

A12—6 to 13 inches; black (10YR 2/1) silty clay loam; dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common roots; neutral; clear smooth boundary.

A3—13 to 20 inches; very dark gray (10YR 3/1) mixed with some gray (10YR 5/1) silty clay loam; gray (10YR 5/1 & 6/1) dry; moderate very fine and fine subangular blocky structure; friable; few roots; neutral; clear smooth boundary.

B21g—20 to 26 inches; olive gray (5Y 5/2) silty clay loam; few fine distinct olive (5Y 5/4) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; friable; few roots; thin discontinuous dark gray (5Y 4/1) clay films on faces of peds; mildly alkaline; clear smooth boundary.

B22g—26 to 40 inches; olive gray (5Y 5/2) with some olive (5Y 5/3) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; moderate fine and medium prismatic structure; friable; few roots; medium subangular blocky structure in upper part of horizon; thin discontinuous dark gray (5Y 4/1) and gray (5Y 5/1) clay films on faces of peds; very dark gray (5Y 3/1) krotovina present; few fine dark concretions (iron and manganese oxides); mildly alkaline; gradual smooth boundary.

B3g—40 to 60 inches; mottled olive gray (5YR 5/2) and gray (5Y 6/1) silt loam; few fine prominent light olive brown (2.5Y 5/6) mottles; moderate coarse prismatic structure; friable; few roots; thin discontinuous olive gray (5Y 4/2) clay films on faces of peds; one very dark gray (10YR 3/1) krotovina present; few very dark gray (10YR 3/1) root channel linings; few fine dark concretions (iron and manganese oxides); mildly alkaline.

The solum ranges from 36 to 60 inches in thickness. It commonly ranges from slightly acid to mildly alkaline, and the C horizon is neutral or mildly alkaline.

The dark colored layers extend into the upper part of the B horizon in some pedons, and they range from 12 to 24 inches in thickness. The B horizon has hue of 5Y with chroma of 2 or less; 2.5Y with chroma of 1 or 2 and mottles, or 10YR with chroma of 1 and mottles.

Sawmill series

This series consists of poorly drained soils that have moderate permeability. These soils formed in alluvial sediment. They formed under prairie grasses and trees on wet flood plains. Slope ranges from 0 to 3 percent.

Sawmill soils are similar to Comfrey soils and are near Drummer, Millington, Radford, and Selma soils. Comfrey soils have more sand in the solum. Drummer and Selma soils do not have a cumulic surface layer. Radford soils have better natural drainage. Millington soils are calcareous throughout the solum.

Typical pedon from an area of Sawmill silty clay loam on a flood plain about 1 mile west and 1/4 mile north of Egan, 1,195 feet south and 618 feet east of center of sec. 2, T. 25 N., R. 9 E.

Ap—0 to 6 inches; black (10YR 2/1) silty clay loam; dark gray (10YR 4/1) dry; moderate very fine and fine granular structure; friable; few roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A12—6 to 21 inches; black (N 2/0) silty clay loam; dark gray (5Y 4/1) dry; moderate very fine subangular

blocky structure; friable; few roots; mildly alkaline; clear smooth boundary.

A3—21 to 27 inches; black (5Y 2/1) silty clay loam; dark gray (5Y 4/1) dry; moderate very fine subangular blocky structure; friable; few roots; mildly alkaline; clear smooth boundary.

B2g—27 to 33 inches; gray (5Y 5/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6 & 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin continuous dark gray (5Y 4/1) organic films on faces of peds; mildly alkaline; clear smooth boundary.

B3g—33 to 40 inches; mottled gray (5Y 5/1), yellowish brown (10YR 5/6), and greenish gray (5GY 6/1) silty clay loam; weak coarse prismatic structure; friable; few roots; thin discontinuous dark gray (5Y 4/1) organic films on faces of peds; mildly alkaline; clear smooth boundary.

C1g—40 to 46 inches; greenish gray (5GY 6/1) silty clay loam; many medium prominent light olive brown (2.5 5/6) mottles; massive; firm; few roots; mildly alkaline; clear smooth boundary.

C2g—46 to 60 inches; greenish gray (5GB 5/1) silt loam; massive; firm; few roots; mildly alkaline.

The solum ranges from 36 inches to more than 60 inches in thickness. It generally is mildly alkaline but ranges to slightly acid. The dark surface layer ranges from 24 to 36 inches in thickness.

The A horizon has color value of 2 or 3 and has chroma of 1 or 2 or is neutral. The gleyed B horizon has hue of 10YR, 5Y, or 2.5Y; value of 4 or more; and chroma of 2 or less. The lower part of the B horizon is silty clay loam, clay loam, loam, or in some pedons, strata of silt loam and sandy loam. The C horizon is silty clay loam or clay loam. It generally contains strata of loam, silt loam, or sandy loam.

Saybrook series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in 20 to 40 inches of loess and loamy glacial till. They formed under prairie vegetation. Slope ranges from 2 to 10 percent.

Saybrook soils are similar to Catlin and Plano soils and are near Catlin, Flanagan, Parr, and Plano soils. Catlin and Plano soils have a thicker layer of loess over glacial drift. Flanagan soils have a thicker solum and are somewhat poorly drained. Parr soils are higher in sand content throughout the solum.

Typical pedon from an area of Saybrook silt loam, 2 to 5 percent slopes, on an upland till plain about 1 3/4 miles west of Creston along Illinois 64, 938 feet east and 93 feet south of northwest corner of sec. 22, T. 40 N., R. 2 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) mixed with some very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted because of tillage; a few worm channels; several pebbles; neutral; abrupt smooth boundary.

A3—8 to 11 inches; mixed very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common roots; neutral; clear smooth boundary.

B21t—11 to 18 inches; brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—18 to 24 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; friable; few roots; thin discontinuous dark grayish brown (10YR 4/2) and dark brown (10YR 4/3) clay films on faces of peds; few fine dark concretions (iron and manganese oxides), especially in lower part; few root channels; medium acid; clear smooth boundary.

B23t—24 to 28 inches; grayish brown (10YR 5/2) silty clay loam; moderate medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark grayish brown (10YR 4/2) and dark brown (10YR 4/3) clay films on faces of peds; common fine dark concretions (iron and manganese oxides); few pebbles in lower part; few thin very dark grayish brown (10YR 3/2) root channel linings; slightly acid; clear smooth boundary.

IIB3t—28 to 34 inches; mottled yellowish brown (10YR 5/6 and 5/8) loam; weak medium prismatic structure; friable; few roots; thin patchy dark brown (10YR 4/3) clay films on faces of peds; 8 percent pebbles; common fine dark concretions (iron and manganese oxides); mildly alkaline; abrupt smooth boundary.

IIC—34 to 60 inches; brown (7.5YR 5/4) loam; massive; firm; 7 percent pebbles; common light gray (10YR 7/2) calcium carbonate accumulations; violent effervescence; moderately alkaline.

The solum ranges from 24 to 42 inches in thickness. The A horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The B horizon has color value of 4 or 5 and chroma of 3 through 6.

In map unit 145C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Selma series

This series consists of poorly drained soils that have moderate permeability in the subsoil and moderate or moderately rapid permeability in the substratum. These soils formed in loamy outwash on stream terraces and outwash plains. They formed under reed and sedge vegetation. Slope ranges from 0 to 2 percent.

Selma soils are similar to Drummer soils and are near Canisteo, Comfrey, Elburn, and La Hogue soils. Drummer soils have a fine and silty solum. Canisteo soils are calcareous throughout the solum. Comfrey soils have a dark colored cumulic surface layer. La Hogue soils have better natural drainage.

Typical pedon from an area of Selma clay loam on an outwash plain about 1 mile east of Flagg Center, 508 feet east and 368 feet north of center of sec. 15, T. 40 N., R. 1 E.

A11—0 to 10 inches; black (10YR 2/1) clay loam, very dark gray (10YR 3/1) dry; strong fine and medium granular structure; friable; many roots; few pebbles; slightly acid; clear smooth boundary.

A12—10 to 18 inches; black (10YR 2/1) loam; dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; many roots; few pebbles; neutral; clear smooth boundary.

A3—18 to 22 inches; mixed very dark gray (10YR 3/1) and dark gray (10YR 4/1) loam; gray (10YR 6/1) dry; weak fine prismatic structure parting to moderate medium granular; friable; common roots; few pebbles; mildly alkaline; clear wavy boundary.

B21g—22 to 28 inches; gray (5Y 5/1) loam; few fine prominent yellowish brown (10YR 5/4) mottles; moderate fine and medium prismatic structure; friable; few roots; few krotovina tongues from horizon above; few fine dark concretions (iron and manganese oxides); 2 percent pebbles; mildly alkaline; clear smooth boundary.

B22g—28 to 34 inches; gray (5Y 5/1) loam; many medium prominent yellowish brown (10YR 5/4) mottles; moderate fine and medium prismatic structure; friable; few krotovina tongues from A horizon; few fine dark concretions (iron and manganese oxides); 2 percent gravel; mildly alkaline; clear smooth boundary.

B3g—34 to 45 inches; gray (5Y 5/1) stratified loam, clay loam, and sandy loam; common fine and medium prominent yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure; friable; few pebbles; mildly alkaline; gradual smooth boundary.

Cg—45 to 60 inches; gray (5Y 5/1) stratified sandy loam and loam; many fine and medium prominent yellowish brown (10YR 5/4 & 5/6) mottles; massive; friable; 2 percent gravel; mildly alkaline.

The solum ranges from 35 to 55 inches in thickness and from slightly acid to mildly alkaline. The dark colored surface layer ranges from 12 to 23 inches in thickness, and in some pedons, it extends into the B horizon.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. It typically is loam, silt loam, silty clay loam, or clay loam. The B horizon has hue of 2.5Y or 5Y, value of 4 through 6, and chroma of 1 or 2. It is dominantly clay loam or loam but is sandy clay loam or sandy loam in places. The C horizon is stratified sand, loamy sand, loam, silt loam, and sand loam and occasionally some gravel.

Sidell series

This series consists of well drained soils that have moderate permeability. These soils formed in loess and glacial till under prairie vegetation. They are on uplands and till plains. Slope ranges from 2 to 5 percent.

Sidell soils are similar to and are near Ashdale, Catlin, Jasper, Plano, and Rockton soils. Catlin soils have less sand in the lower part of the B horizon. In Ashdale and Rockton soils, the solum is terminated by bedrock. Jasper soils are fine and loamy in the upper part of the solum. Plano soils have more sand in the lower part of the solum, and they formed in glacial outwash.

Typical pedon from an area of Sidell silt loam, 2 to 5 percent slopes, on a loess covered, upland till plain about 1 1/2 miles north of Monroe Center, 1,361 feet south and 620 feet east of northwest corner of sec. 15, T. 42 N., R. 2 E.

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; many roots; layer compacted because of tillage; slightly acid; abrupt smooth boundary.

A12—5 to 11 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; many roots; layer compacted because of tillage; slightly acid; clear smooth boundary.

A3—11 to 16 inches; very dark grayish brown (10YR 3/2) with some dark brown (10YR 4/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine and medium subangular blocky structure parting to moderate fine and medium granular; friable; many roots; light gray (10YR 7/1) uncoated silt grains on faces of peds; slightly acid; clear smooth boundary.

B21t—16 to 22 inches; dark brown (10YR 4/3) silty clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; common roots; thin continuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

B22t—22 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to strong fine and medium subangular blocky; friable; common roots; thin discontinuous dark brown (10YR 3/3) clay films and light gray

(10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

IIB23t—28 to 34 inches; yellowish brown (10YR 5/4) loam; weak medium prismatic structure parting to strong fine and medium subangular blocky; friable; few roots; moderate continuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; clear smooth boundary.

IIB24t—34 to 43 inches; yellowish brown (10YR 5/4) loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; moderate continuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; many very dark grayish brown (10YR 3/2) root channel fillings; medium acid; clear smooth boundary.

IIB25t—43 to 52 inches; yellowish brown (10YR 5/4) loam; moderate medium and coarse prismatic structure; friable; few roots; moderate discontinuous dark brown (10YR 3/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; common very dark grayish brown (10YR 3/2) root channel fillings; slightly acid; clear smooth boundary.

IIB3t—52 to 58 inches; yellowish brown (10YR 5/4) clay loam; moderate coarse prismatic structure; firm; few roots; moderate discontinuous dark brown (10YR 4/3 & 3/3) clay films on faces of peds; few very dark grayish brown (10YR 3/2) root channel fillings; neutral; gradual smooth boundary.

IIC—58 to 60 inches; yellowish brown (10YR 5/4) clay loam; massive; firm; some strong brown (7.5YR 5/6) horizontal strata; few very dark grayish brown (10YR 3/2) root channel fillings; 3.5 percent pebbles; slight effervescence; moderately alkaline.

The solum ranges from 45 to 64 inches in thickness. The loess ranges from 24 to 40 inches in thickness over leached glacial till. Calcareous loam or clay loam till is between depths of about 45 and 60 inches.

The A horizon ranges from 10 to 18 inches in thickness. It has color value of 2 or 3 and chroma of 1 through 3. Some pedons have a B1 horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. The IIB horizon has color value of 4 or 5 and chroma of 3, 4 or less commonly 6. It typically is loam, silt loam, or clay loam and is sometimes stratified.

Sogn series

This series consists of somewhat excessively drained soils that have moderate permeability. This soils formed in thin loamy layers over limestone and dolomite bedrock. They formed under prairie grasses on uplands. Slope ranges from 7 to 45 percent.

The climate is more humid, slopes are steeper, and the native vegetation contains more trees than is defined as the range of the series. These differences do not alter the use or behavior of this soil.

Typical pedon from an area of Sogn loam, 7 to 15 percent slopes, about 1 1/2 miles north of Monroe Center, 1,809 feet south and 643 feet west of northeast corner of sec. 16, T. 42 N., R. 2 E.

A1—0 to 10 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate very fine and fine granular structure; very friable; many roots; neutral; abrupt smooth boundary.

R—10 inches; yellow (10Y 7/6) hard level bedded limestone bedrock; strong effervescence; moderately alkaline.

The thickness of solum and depth to hard limestone and dolomite range from 4 to 20 inches.

The A horizon has hue of 7.5YR through 2.5Y, value of 3 through 5 dry and 2 or 3 moist, and chroma of 1 through 3. The soil ranges from loam through silty clay loam. It ranges from slightly acid through moderately alkaline. In many pedons, the soil contains free carbonates and fragments of limestone.

Sparta series

This series consists of excessively drained soils that have rapid permeability. These soils formed in sandy alluvium that is reworked by the wind in many places. They formed under prairie vegetation and widely spaced hardwood trees on stream terraces and outwash plains. Slope ranges from 0 to 6 percent.

Sparta soils are similar to Dickinson soils and are near Chelsea, Jasper, and Lamont soils. Dickinson soils have less sand in the solum. Chelsea and Lamont soils lack a mollic surface layer. Jasper soils have more clay and have a thicker solum.

Typical pedon from an area of Sparta loamy sand, 0 to 6 percent slopes, on the Rock River terrace, about 2 1/2 miles south of Oregon, 490 feet south and 701 feet west of center of sec. 20, T. 23 N., R. 10 E.

A1—0 to 10 inches; very dark gray (10YR 3/1) loamy sand, grayish brown (10YR 5/2) dry; very weak medium subangular blocky structure parting to moderate very fine granular; very friable; many roots; neutral; clear smooth boundary.

A3—10 to 17 inches; very dark grayish brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; very weak medium and coarse subangular blocky structure parting to moderate very fine granular; very friable; common roots; quartz grains are dark brown (10YR 4/3); neutral; clear smooth boundary.

B21—17 to 24 inches; dark yellowish brown (10YR 4/4) sand; weak medium and coarse subangular blocky structure parting to moderate very fine granular; very friable; common roots; thin very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) clay and

organic films on some sand grains; strongly acid; clear smooth boundary.

B22—24 to 31 inches; brown (7.5YR 5/4) sand; weak medium and coarse subangular blocky structure; very friable; few roots; medium acid; clear smooth boundary.

C—31 to 60 inches; reddish yellow (7.5YR 6/6) sand; single grained; loose; medium acid.

The solum ranges from 24 to about 40 inches in thickness.

The dark colored A horizon ranges from 10 to 24 inches in thickness. The A1 horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. It is loamy sand, loamy fine sand, or sand. The B horizon has hue of 10YR or 7.5YR and value and chroma of 4, 5, or 6. It is sand, fine sand, loamy sand, or loamy fine sand.

St. Charles series

This series consists of moderately well drained soils that have moderate permeability. These soils formed in 40 to 60 inches of loess and moderately coarse textured glacial outwash or till. They formed under forest vegetation on stream terraces and outwash plains. Slope ranges from 0 to 10 percent.

St. Charles soils are similar to and are near Birkbeck, Fayette, Flagg, and Rozetta soils. Birkbeck soils have less sand and more clay in the lower part of the solum. Fayette and Rozetta soils have less sand in the lower part of the solum. In Flagg soils, hue is redder in one or more horizons.

Typical pedon from an area of St. Charles silt loam, 2 to 5 percent slopes, on a stream terrace of the Rock River, about 1 1/2 miles south of Oregon along Illinois Route 2, 1,956 feet south and 326 feet east of northwest corner of sec. 15, T. 23 N., R. 10 E.

A1—0 to 4 inches; very dark gray (10YR 3/1) mixed with some brown (10YR 5/3) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; many roots; neutral; clear smooth boundary.

A21—4 to 9 inches; brown (10YR 5/3) silt loam; strong thin and medium platy structure; friable; common roots; some very dark gray (10YR 3/1) worm channel fillings; neutral; clear smooth boundary.

A22—9 to 13 inches; yellowish brown (10YR 5/4) silt loam; weak medium platy structure parting to moderate fine subangular blocky; friable; common roots; strongly acid; clear smooth boundary.

B1t—13 to 17 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin continuous yellowish brown (10YR 5/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B21t—17 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; weak fine prismatic structure parting to strong fine and medium subangular blocky; firm; common roots; moderate continuous yellowish brown (10YR 5/4) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B22t—24 to 29 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to strong fine and medium subangular blocky; firm; few roots; moderate discontinuous yellowish brown (10YR 5/4) clay films, moderate patchy dark brown (7.5YR 4/4) clay films, and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B23t—29 to 38 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium and coarse prismatic structure parting to strong medium subangular blocky; firm; few roots; moderate discontinous dark brown (7.5YR 4/4) clay films, patchy yellowish brown (10YR 5/4) clay films, and light gray (10YR 7/1) uncoated silt grains on faces of peds; strongly acid; clear smooth boundary.

B24t—38 to 46 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate coarse subangular blocky; friable; few roots; moderate discontinuous dark brown (7.5YR 4/4) clay films, thin patchy yellowish brown (10YR 5/4) clay films, and light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark accumulations (iron and manganese oxides); few very dark gray (10YR 3/1) root channel fillings; strongly acid; abrupt smooth boundary.

IIB3—46 to 57 inches; stratified pale brown (10YR 6/3), brown (10YR 5/3), yellowish brown (10YR 5/6), dark brown (7.5YR 4/4), and strong brown (7.5YR 5/6) loam, sandy loam, loamy sand, and silt loam; weak coarse prismatic structure; friable; few roots; 2 percent pebbles; strongly acid; clear smooth boundary.

IIC—57 to 60 inches; dark brown (7.5YR 4/4) sandy loam; massive; friable; about 15 percent pebbles; neutral.

The solum ranges from 44 inches to more than 65 inches in thickness. Carbonates are at a depth ranging from 45 inches to more than 70 inches. The solum commonly is medium acid throughout but ranges from strongly acid to neutral.

The A2 horizon has color value of 4 through 6 and hue of 2 through 4. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. The IIB horizon is stratified with layers of loam, sandy loam, loamy sand, and silt loam and is less than 10 percent pebbles. The IIC horizon is stratified outwash. It generally is less than 10 percent pebbles, but in some pedons, layers are as much as 30 percent fine pebbles.

Stronghurst series

This series consists of somewhat poorly drained soils that have moderate or moderately slow permeability. These soils formed in loess. They formed under forest vegetation on uplands and terraces. Slope ranges from 0 to 3 percent.

Stronghurst soils are similar to Atterberry and Kendall soils and are near Fayette, Flagg, and Rozetta soils. Atterberry soils have a mollic surface layer. Kendall soils formed in loess and glacial outwash. Fayette and Rozetta soils have better natural drainage. Flagg soils have better natural drainage and formed in glacial drift.

Typical pedon from an area of Stronghurst silt loam, 0 to 3 percent slopes, in an upland depression about 1 1/2 miles west and 1 1/4 miles north of Mt. Morris, 567 feet east and 77 feet south of the northwest corner of sec. 21, T. 24 N., R. 9 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) mixed with some grayish brown (10YR 5/2) silt loam, light gray (10YR 7/1) dry; moderate fine granular structure; friable; common roots; layer compacted because of tillage; few fine dark concretions (iron and manganese oxides); neutral; abrupt smooth boundary.

A2—7 to 11 inches; grayish brown (10YR 5/2) mixed with some brown (10YR 5/3) heavy silt loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to moderate fine granular; friable; few roots; few light gray (10YR 7/1) uncoated silt grains on faces of peds; few fine dark concretions (iron and manganese oxides); neutral; clear smooth boundary.

B1t—11 to 18 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few roots; thin grayish brown (10YR 5/2) continuous clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; common fine dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B21t—18 to 25 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to strong fine and medium subangular blocky; friable; few roots; thin grayish brown (10YR 5/2) continuous clay films on faces of peds; many medium and coarse dark concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

B22t—25 to 34 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; moderate grayish brown (10YR 5/2) continuous clay films on faces of peds; many medium and coarse dark concretions (iron and manganese oxides); strongly acid; clear smooth boundary.

B23t—34 to 44 inches; mottled grayish brown (2.5Y 5/2) yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/4) silty clay loam; moderate coarse prismatic structure; friable; few roots; moderate dark grayish brown (2.5Y 4/2) discontinuous clay films on faces of peds; many medium and coarse dark concretions (iron and manganese oxides); medium acid; clear smooth boundary.

B3—44 to 55 inches; mottled grayish brown (2.5Y 5/2) light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4) silt loam; weak coarse prismatic structure; friable; few roots; thin dark grayish brown (2.5Y 4/2) discontinuous clay films on faces of peds; many coarse dark concretions (iron and manganese oxides); very dark gray (10YR 3/1) root channel linings; slightly acid; gradual smooth boundary.

C—55 to 66 inches; mottled light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4 & 5/6) heavy silt loam; massive; friable; many coarse dark concretions (iron and manganese oxides); very dark gray (10YR 3/1) root channel linings; neutral.

The solum ranges from 42 to 60 inches or more in thickness.

The Ap horizon has color value of 4 through 6 and chroma of 1 or 2. The A2 horizon has color value of 4 or 5 and chroma of 2 or 3. The B horizon has color hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 6. The C horizon ranges from medium acid to neutral in the upper part to calcareous at a depth of about 5 feet.

Symerton series

This series consists of well drained soils that have moderate permeability in the upper part of the subsoil and moderately slow permeability in the lower part. These soils formed in loamy outwash and clay loam till or lakebed sediment. They formed under prairie vegetation on till plains or lakebeds. Slope ranges from 1 to 10 percent.

Symerton soils are similar to Catlin, Jasper, and Parr soils and are near Dickinson, Jasper, Parr, and Varna soils. Catlin soils have less sand in the solum. Dickinson soils have more sand in the upper part of the solum and less clay in the lower part. Jasper soils are stratified in the lower part of the B horizon and in the C horizon. Parr and Varna soils have a thinner solum and have glacial till at a depth of less than 40 inches.

Typical pedon from an area of Symerton loam, 1 to 5 percent slopes, on an outwash covered till plain about 1 1/4 miles west and 1/2 mile north of Monroe Center, 2,640 feet west and 22 feet north of southeast corner of sec. 17, T. 42 N., R. 2 E.

Ap—0 to 10 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; strong fine and

medium granular structure; friable; common roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A3—10 to 17 inches; very dark grayish brown (10YR 3/2) with some dark brown (10YR 3/3 and 4/3) loam, grayish brown (10YR 5/2) dry; loamy, weak medium subangular blocky structure parting to strong very fine and fine granular; friable; common roots; neutral; clear smooth boundary.

B21t—17 to 25 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak coarse subangular blocky structure; friable; few roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—25 to 35 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

B23t—35 to 47 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to strong medium subangular blocky; friable; few roots; thin discontinuous dark brown (10YR 4/3) clay films and light gray (10YR 7/1) uncoated silt grains on faces of peds; medium acid; abrupt smooth boundary.

IIB3t—47 to 53 inches; yellowish brown (10YR 5/4) clay loam; moderate coarse prismatic structure; firm; moderately thick continuous brown (10YR 5/3) clay films on vertical faces of peds; few small pebbles; mildly alkaline; clear smooth boundary.

IIC—53 to 60 inches; light yellowish brown (10YR 6/4) clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine prominent strong brown (7.5YR 5/6) mottles; massive; firm; 2 percent pebbles; strong effervescence; moderately alkaline.

The solum ranges from 30 to 55 inches in thickness. Carbonates are most commonly at a depth of about 40 inches but range from a depth of 26 to 55 inches.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon typically has color value of 4 through 6 and chroma of 3 through 6. The B2 horizon typically is silty clay loam, clay loam, or sandy clay loam. The C horizon is till or lakebed sediment; the lakebed sediment commonly contains thin strata of loam, silt loam, or silty clay.

In map unit 294C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Tama series

This series consists of well drained soils that have moderate permeability. These soils formed in loess. They formed under prairie vegetation on uplands. Slope ranges from 0 to 10 percent.

Tama soils are similar to and are near Ashdale, Catlin, Downs, Muscatine, and Ogle soils. Ashdale soils formed in thinner loess, and limestone bedrock is at depth of 40 to 60 inches. Downs soils have a thinner A horizon and have an A2 horizon. Muscatine soils have poorer natural drainage. Catlin and Ogle soils formed in thinner loess, and glacial drift is at a depth of 40 to 60 inches.

Typical pedon from an area of Tama silt loam, 2 to 5 percent slopes, on an upland ridge about 4 miles west of Polo, 558 feet north and 52 feet east of southwest corner of sec. 14, T. 23 N., R. 7 E.

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common roots; layer compacted because of agricultural practices; neutral; abrupt smooth boundary.

A12—7 to 12 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium structure; friable; few roots; weak plates as a result of compaction; neutral; clear smooth boundary.

A13—12 to 17 inches; very dark grayish brown (10YR 3/2) mixed with some dark yellowish brown (10YR 4/4) silt loam, grayish brown (10YR 5/2) dry; weak very coarse granular structure parting to moderate fine and medium granular; friable; few roots; neutral; clear smooth boundary.

B1t—17 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak coarse subangular blocky structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark yellowish brown (10YR 3/4) clay films and uncoated silt grains on faces of peds; medium acid; gradual smooth boundary.

B21t—23 to 37 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine and medium subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; gradual smooth boundary.

B22t—37 to 53 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; friable; few roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

B3t—53 to 59 inches; mixed yellowish brown (10YR 5/4 and 5/6) with some very dark grayish brown (10YR 3/2) silt loam; weak coarse prismatic structure; friable; few roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; few fine dark concretions (iron and manganese oxides); medium acid; gradual smooth boundary.

C—59 to 68 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine dark concretions (iron and manganese oxides); slightly acid.

The solum ranges from 40 to 60 inches or more in thickness.

The A1 or Ap horizon is black (10YR 2/1) or very dark brown (10YR 2/2), but the Ap horizon of some eroded soils ranges to very dark grayish brown (10YR 3/2). Mottles are evident in the lower part of the B horizon in some pedons.

In map unit 36C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Varna series

This series consists of moderately well drained soils that have moderately slow permeability in the upper part of the subsoil and slow permeability in the lower part of the subsoil and the substratum. These soils formed in windworked deposit and calcareous glacial till of silty clay loam or clay loam. They formed under prairie vegetation on glacial till plains. Slope ranges from 2 to 10 percent.

Varna soils are similar to Symerton soils and are near Catlin, La Hogue, Parr, and Saybrook soils. Symerton soils have more sand and less clay in the solum. Catlin, Parr, and Saybrook soils all have less clay in the solum and are underlain by lighter textured glacial drift. La Hogue soils are somewhat poorly drained.

Typical pedon from an area of Varna silt loam, 2 to 5 percent slopes, on an upland till plain abut 2 3/4 miles north of Monroe Center, 836 feet north and 362 feet west of southeast corner of sec. 4, T. 42 N., R. 2 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; many roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A3—9 to 14 inches; very dark grayish brown (10YR 3/2) with some dark brown (10YR 4/3) silty clay loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

B21t—14 to 18 inches; dark brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure parting to moderate very fine subangular blocky; friable; few roots; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—18 to 24 inches; dark brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; few roots; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B23t—24 to 32 inches; brown (10YR 5/3) silty clay; strong medium prismatic structure parting to strong medium subangular blocky; firm; few roots; thick discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear smooth boundary.

B24t—32 to 40 inches; brown (10YR 5/3) silty clay; strong medium prismatic structure; firm; few roots; thin discontinuous grayish brown (10YR 5/2) and dark grayish brown (10YR 4/2) clay films on faces of peds; few pebbles; common soft calcium carbonate accumulations; strong effervescence; moderately alkaline; clear smooth boundary.

B3t—40 to 52 inches; brown (10YR 5/3) clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; few roots; thin patchy grayish brown (10YR 5/2) clay films on faces of peds; common soft calcium carbonate accumulations; 1 percent pebbles; strong effervescence; moderately alkaline; gradual smooth boundary.

C—52 to 60 inches; pale brown (10YR 6/3) clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; 2 percent pebbles; common soft calcium carbonate accumulations; strong effervescence; moderately alkaline.

The solum ranges from 30 to 60 inches in thickness. The A horizon ranges from 10 to 16 inches in thickness. The A1 or Ap horizon has color value of 2 or 3 and chroma of 1 or 2. The B horizon has hue of 10YR, 2.5Y or 5Y; value of 4 through 6, and chroma of 3 or 4 in the upper part and 1 through 4 in the lower part. The B horizon ranges from silty clay to clay loam.

In map unit 223C2, the surface layer is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Warsaw series

This series consists of well drained soils that have moderate permeability in the subsoil and very rapid permeability in the substratum. These soils formed in outwash that overlies calcareous sand and gravel at a depth of 24 to 40 inches. They formed under prairie vegetation on outwash plains and terraces. Slope ranges from 1 to 5 percent.

Warsaw soils are similar to Fox soils and are near Dickinson, Jasper, Parr, and Wea soils. Fox soils do not have mollic colored surface layer and have an A2 horizon. Dickinson and Jasper soils have no gravel or till within 60 inches of the surface. Parr soils are underlain by glacial till at a depth of less than 40 inches. In Wea soils, the solum is more than 40 inches thick.

Typical pedon from an area of Warsaw loam, 1 to 5 percent slopes, on a glacial kame terrace about 2 miles east and 1/2 mile north of Davis Junction, 1,154 feet west and 808 feet north of southeast corner of sec. 13, T. 42 N., R. 1 E.

Ap—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; many roots; slightly acid; clear smooth boundary.

A12—6 to 11 inches; mixed very dark brown (10YR 2/2) and very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate very fine and fine granular structure; friable; common roots; slightly acid; clear smooth boundary.

A3—11 to 16 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; common roots; thin very dark brown (10YR 2/2) root channel linings; few pebbles; slightly acid; clear smooth boundary.

B21t—16 to 22 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium subangular blocky structure; friable; common roots; thin discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; 9 percent pebbles; medium acid; clear smooth boundary.

B22t—22 to 28 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable; common roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; 4 percent pebbles; medium acid; clear smooth boundary.

B23t—28 to 33 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium and coarse subangular blocky structure; friable; common roots; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; 4 percent pebbles; medium acid; clear smooth boundary.

B3t—33 to 36 inches; yellowish brown (10YR 5/6) sandy loam; weak coarse subangular blocky structure; friable; few roots; thin patchy dark yellowish brown (10YR 4/4) clay films on faces of peds; 18 percent pebbles; slight effervescence; moderately alkaline; abrupt wavy boundary.

IIC—36 to 60 inches; yellowish brown (10YR 5/4) sand and gravel; single grained; loose; few roots; 60 percent pebbles; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 40 inches and commonly is the same as the depth to free carbonates and the depth to sand and gravel. In some pedons, a silt layer on the surface is as much as 24 inches thick.

The dark colored surface layer ranges from 12 to 20 inches in thickness and in some pedons extends into the upper part of B horizon. The Ap or A1 horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. These horizons are silt loam, loam, or sandy loam. The B2t horizon has hue of 10YR, 7.5YR, or 5YR; value of 3 through 5; and dominant chroma of 3 through 6 but ranges to 2 in the upper part. It typically is sandy clay loam, clay loam, gravelly clay loam, or gravelly sandy clay loam, but individual horizons range from sandy loam to silty clay loam. In some pedons, tongues of the B2t horizon extend several feet into the C horizon.

Waukee series

This series consists of well drained soils that have moderate permeability in the subsoil and very rapid permeability in the underlying material. These soils formed in alluvial sediment under prairie vegetation on outwash plains and terraces. Slope ranges from 1 to 5 percent.

Waukee soils are near Dickinson, Jasper, La Hogue, and Parr soils. Dickinson soils have more sand in the solum. Jasper soils have less sand in the lower part of the solum and do not have contrasting textures. La Hogue soils have poorer natural drainage. Parr soils are underlain by glacial till.

Typical pedon from an area of Waukee loam, 1 to 5 percent slopes on a river terrace about 4 miles east of Grand Detour, 580 feet east and 283 feet south of northwest corner of sec. 15, T. 22 N., R. 10 E.

Ap—0 to 10 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate very fine and fine granular structure; friable; few roots; layer compacted because of tillage; neutral; abrupt smooth boundary.

A3—10 to 15 inches; very dark grayish brown (10YR 3/2) with some very dark gray (10YR 3/1) loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; few roots; slightly acid; clear smooth boundary.

B21t—15 to 22 inches; dark yellowish brown (10YR 3/4) loam; moderate fine and medium subangular blocky structure; friable; few roots; thin continuous very dark grayish brown (10YR 3/2) and dark brown (10YR 3/3) clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—22 to 30 inches; dark brown (10YR 4/3) loam; moderate fine and medium subangular blocky structure, friable; few roots; thin continuous dark brown (10YR 3/3) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); few pebbles; strongly acid; clear smooth boundary.

IIB3—30 to 41 inches; yellowish brown (10YR 5/4) loamy sand; weak coarse prismatic structure; very friable; few roots; few pebbles; strongly acid; clear smooth boundary.

IIC—41 to 60 inches; mixed yellowish brown (10YR 5/6 and 5/4) sand; single grained; loose few pebbles; few dark iron stains at a depth of 54 to 68 inches; medium acid.

The solum typically ranges from 30 to 48 inches in thickness, but in some places, it is only 24 inches thick. Sandy and gravelly material is typically at a depth of 30 to 40 inches, but it ranges to as shallow as 24 inches.

The A horizon is loam or silt loam that is high in content of sand. It ranges from about 12 to 18 inches in thickness. The B2 horizon centers on hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. It is loam or sandy clay loam. A thin zone of sandy loam less than 5 inches thick is just above the sandy material in

some pedons. The C horizon contains some gravel, and some strata are as much as 20 to 50 percent gravel, by volume.

Wea series

This series consists of well drained soils that have moderate permeability in the solum and very rapid permeability in the substratum. These soils formed in a thin layer of loess and loamy drift overlying calcareous sand and gravel. They formed under prairie vegetation on outwash plains and stream terraces. Slope ranges from 0 to 5 percent.

Wea soils are similar to Jasper soils and are near Dickinson, Jasper, Plano, and Warsaw soils. Dickinson, Jasper, and Plano soils do not have gravel in the lower part of the solum. Warsaw soils have a thinner solum and have sand and gravel at a depth of less than 40 inches.

Typical pedon from an area of Wea silt loam, 2 to 5 percent slopes, on a gravel terrace about 1 1/2 miles south of Oregon, 1,815 feet south and 2,635 feet east of northwest corner of sec. 15, T. 23 N., R. 10 E.

Ap—0 to 6 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; common roots; layer compacted because of tillage; few sand grains visible; slightly acid; abrupt smooth boundary.

A12—6 to 11 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; few roots; few visible sand grains present; slightly acid; clear smooth boundary.

B21t—11 to 19 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; few roots; thin discontinuous dark brown (10YR 3/3) clay films on faces of peds; few visible sand grains; slightly acid; clear smooth boundary.

IIB22t—19 to 33 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; few roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB23t—33 to 45 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; weak prismatic structure in places; friable; few roots; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; 2 percent pebbles; slightly acid; clear smooth boundary.

IIB3—45 to 57 inches; dark brown (7.5YR 4/4) gravelly loamy sand; weak coarse subangular blocky structure; very friable; about 17 percent pebbles; slightly acid; clear smooth boundary, boundary is wavy in places.

IIC—57 to 60 inches; brown (7.5YR 5/4) and strong brown (7.5YR 5/6) sand and gravel; single grained; loose; slight effervescence; moderately alkaline.

The solum thickness ranges from 40 inches to as much as 70 inches and typically is the same as the depth to sand and gravel.

The A horizon has color value of 2 or 3 and chroma of 1 or 2. It is silt loam to loam. The B horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. In some pedons, mottles are at a depth of more than 36 inches. The Bt horizon commonly is clay loam; individual horizons of silt loam or silty clay loam are in the upper part of the Bt horizon of some pedons, and gravelly clay loam, clay, gravelly clay, sandy loam, or loamy sand horizons are in the lower part. Loamy sand horizons are at a depth of more than 40 inches. The Bt horizon ranges from slightly acid to strongly acid in the upper part to neutral or moderately alkaline in the lower part.

Westville series

This series consists of well drained soils that have moderate permeability. These soils formed in a thin layer of loess and in a reddish buried soil weathered from glacial drift. These soils formed under forest vegetation on uplands. Slope ranges from 5 to 15 percent.

Westville soils are similar to Pecatonica soils and are similar to and are near Kidder, Miami, and Whalan soils. Pecatonica soils have a thicker component of loess above the reddish glacial drift. Kidder and Miami soils have a thinner solum and are underlain by yellowish colored glacial till. Whalan soils are over lime and dolomite bedrock.

Typical pedon from an area of Westville silt loam, 5 to 10 percent slopes, eroded, on the edge of an upland ridge about 5 1/2 miles northwest of Byron, 2,339 feet west and 734 feet south of northeast corner of sec. 10, T. 25 N., R. 10 E.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) mixed with some yellowish brown (10YR 5/4) silt loam, pale brown (10YR 6/3) dry; moderate very fine and fine granular structure; friable; common roots; layer compacted as a result of agricultural practices; strongly acid; abrupt smooth boundary.

B1t—5 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; common roots; thin continuous dark yellowish brown (10YR 4/4) clay films; few very dark grayish brown (10YR 3/2) worm channel fillings; few pebbles; medium acid; clear smooth boundary.

IIB21t—9 to 14 inches; strong brown (7.5YR 5/6) clay loam; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; common roots; moderate continuous dark brown (7.5YR 4/4) clay films on faces of peds; some pebbles; medium acid; clear smooth boundary.

IIB22t—14 to 22 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium prismatic structure parting

to moderate fine and medium subangular blocky; friable; common roots; moderate continuous dark reddish brown (5YR 3/4) clay films on faces of peds; 9 percent pebbles; few black (5YR 2/1) organic films on faces of peds in lower part of horizon; strongly acid; clear smooth boundary.

IIB23t—22 to 29 inches; yellowish red (5YR 4/6) sandy clay loam; weak coarse prismatic structure; friable; few roots; thin continuous dark reddish brown (5YR 3/4) clay films and thin patchy black (5YR 2/1) organic films on faces of peds; 4 percent pebbles; strongly acid; clear smooth boundary.

IIB3t—29 to 42 inches; yellowish red (5YR 4/6) sandy loam; weak coarse prismatic structure; friable; few roots; thin continuous reddish brown (5YR 4/4) clay films and thin patchy black (5YR 2/1) organic films on faces of peds; 2 percent pebbles; neutral; clear smooth boundary.

IIC—42 to 60 inches; mixed yellowish red (5YR 4/6) and strong brown (7.5YR 5/8) stratified loam and sandy loam; massive; friable; few roots; 3 percent pebbles; a few root channel fillings; neutral.

The solum ranges from 3.5 to 9 feet in thickness. The A horizon generally is silt loam but is loam in places. The B horizon has hue of 7.5YR or 5YR and value and chroma of 3 through 6. Some subhorizons have hue of 10YR or higher chroma or both. The B horizon ranges from clay loam or sandy clay loam in the upper part to sandy loam or clay loam in the lower part. There is no B3 horizon in some pedons. The C horizon is calcareous in some pedons. It ranges from gravelly sandy loam to loam and is stratified in some pedons.

Whalan series

This series consists of well drained soils that have moderate permeability in the upper part of the solum and slow permeability in the lower part of the subsoil. These soils formed in glacial drift and residuum from the underlying limestone bedrock. They formed under forest vegetation on bedrock-controlled uplands and valleys. Slope ranges from 1 to 30 percent.

Whalan soils are similar to and are near Flagg, Martinsville, and Miami soils. Flagg, Martinsville, and Miami soils do not have a bedrock layer within the control section.

Typical pedon from an area of Whalan loam, 5 to 10 percent slopes, eroded, on bedrock covered by loam on uplands about 1 mile northeast of Oregon, 1,743 feet south and 605 feet east of northwest corner of sec. 2, T. 23 N., R. 10 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam mixed with some dark brown (10YR 4/3) loam, light brownish gray (10YR 6/2) dry; moderate very fine and fine granular structure; friable; common roots; neutral; abrupt smooth boundary.

B21t—7 to 14 inches; dark brown (10YR 4/3) clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; common roots; thin patchy dark yellowish brown (10YR 3/4) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—14 to 25 inches; dark yellowish brown (10YR 4/4) clay loam; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; friable; common roots; thin discontinuous dark yellowish brown (10YR 3/4) clay films on faces of peds; few pebbles; strongly acid; abrupt smooth boundary.

IIB23t—25 to 29 inches; reddish brown (5YR 4/4) clay; moderate fine and medium prismatic structure parting to moderate medium subangular blocky; firm; common roots; thin patchy reddish brown (10YR 4/3) clay films on faces of peds; very dark grayish brown (10YR 3/2) root channels; few chert particles; slightly acid; abrupt smooth boundary.

IIR—29 inches; brownish yellow (10YR 6/6) dolomite bedrock; strong effervescence; moderately alkaline.

The thickness of the solum and depth to limestone bedrock range from 20 to 40 inches. The solum typically is 2 to 6 percent coarse fragments, but the lower part in some pedons is as much as 20 percent coarse fragments, by volume, which are mainly chert or limestone.

The Ap horizon has color value of 4 or 5 and chroma of 1 through 3. The A1 horizon, where present, has color value of 2 or 3. The A2 horizon, where present, has color value of 4 or 5. The Ap or A1 horizon is silt loam or loam. There is a B1 horizon in some pedons. The B2t horizon has color value of 4 or 5 and chroma of 3 through 5. The IIB horizon has hue of 5YR, 7.5YR, or 10YR; value of 4 through 6; and chroma of 3 through 6. It is clay loam, silty clay loam, clay, or silty clay. Reaction ranges from medium acid to mildly alkaline.

Winnebago series

This series consists of well drained soils that have moderate permeability. These soils formed in less than 15 inches of loess and a reddish buried soil in glacial drift. They formed under prairie vegetation on till uplands. Slope ranges from 5 to 10 percent. This soil has a surface layer that is thinner than is defined as the range for the series, but this difference does not alter the use or behavior of the soil.

Winnebago soils are similar to and are near Durand, Griswold, Jasper, and Parr soils. Durand soils have less sand in the upper part of the B horizon. Griswold, Jasper, and Parr soils do not have a hue of 5YR or redder in the solum.

Typical pedon from an area of Winnebago silt loam, 5 to 10 percent slopes, eroded, on a convex side slope about 2 1/2 miles northwest of Forreston, 743 feet south and 32 feet east of center of sec. 19, T. 25 N., R. 7 E.

Ap—0 to 9 inches; dark brown (10YR 3/3) silt loam; brown (10YR 5/3) dry; moderate medium and fine granular structure; friable; common roots; some sand particles; slightly acid; abrupt smooth boundary.

B21t—9 to 14 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium prismatic structure; friable; common roots; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; about 10 percent pebbles; medium acid; clear smooth boundary.

B22t—14 to 19 inches; yellowish red (5YR 4/6) gravel in clay loam; weak coarse subangular blocky structure; friable; common roots; thin patchy reddish brown (5YR 4/4) clay films on faces of peds; stone line; some pebbles 1 inch to 3 inches in diameter; 25 to 30 percent pebbles; medium acid; abrupt wavy boundary.

B23t—19 to 27 inches; red (2.5YR 4/6) clay loam; weak fine prismatic structure parting to weak medium subangular blocky; friable; common roots; thin discontinuous dark red (2.5YR 3/6) clay films on faces of peds; about 10 percent pebbles; strongly acid; clear wavy boundary.

B24t—27 to 41 inches; red (2.5YR 4/6) gravelly clay loam; weak medium prismatic structure parting to weak medium subangular blocky; friable; few roots; thin discontinuous dark red (2.5YR 3/6) clay films on faces of peds; several cobbles 3 to 5 1/2 inches in diameter; 20 percent pebbles; medium acid; clear wavy boundary.

B31—41 to 53 inches; reddish brown (5YR 4/4) gravelly clay loam; weak coarse prismatic structure; friable; few roots; occasional cobbles; 25 to 30 percent pebbles; medium acid; clear wavy boundary.

B32—53 to 68 inches; red (2.5YR 4/6) sandy clay loam; weak coarse prismatic structure; friable; less than 10 percent pebbles; medium acid.

The solum commonly is 4 to 6 feet thick, and it ranges from 3.5 to 9 feet in thickness.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 through 3. It is normally silt loam containing a moderate amount of sand, but it is loam or sandy loam in some pedons. The B horizon has color hue of 7.5YR, 5YR, or 2.5YR; value of 3 through 6, and chroma of 3 through 6. Some subhorizons in some pedons have hue of 10YR or chroma higher than 4, or both. The Bt horizon is clay loam, sandy clay loam, or loam in the upper part and sandy loam, clay loam, or loam in the lower part. The C horizon, where present, ranges from gravelly sandy loam to loam if the solum is more than 5 feet thick; in some pedons, the C horizon is stratified. Reaction is generally neutral to medium acid in the upper part, but some pedons are calcareous.

Woodbine series

This series consists of well drained soils that have moderate permeability in the upper part of the subsoil and slow permeability in the lower part of the subsoil. These soils formed in loess and glacial drift and in residuum from limestone bedrock. They formed under forest vegetation on uplands. Slope ranges from 2 to 10 percent.

Woodbine soils are similar to and are near Fayette, Martinsville, St. Charles, and Whalan soils. Fayette, Martinsville, and St. Charles soils do not have limestone bedrock within a depth of 60 inches. In Whalan soils, the solum is terminated by limestone bedrock within 40 inches of the surface.

Typical pedon from an area of Woodbine silt loam, 5 to 10 percent slopes, eroded, on a side slope about 1 mile southwest of Payne's Point, 4,620 feet north and 1,042 feet west of southeast corner of sec. 4, T. 23 N., R. 10 E.

Ap—0 to 5 inches; brown (10YR 5/3) mixed with some yellowish brown (10YR 5/4) silt loam; light yellowish brown (10YR 6/4) dry; moderate fine and medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B21t—5 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; common roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine dark accumulations (iron and manganese oxides); medium acid; clear smooth boundary.

B22t—12 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; common roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; few fine dark stains (iron and manganese oxides); medium acid; clear smooth boundary.

IIB23t—18 to 26 inches; yellowish brown (10YR 5/4) clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common roots; thin continuous dark brown (10YR 4/3) clay films on faces of peds; few fine dark stains (iron and manganese oxides); medium acid; clear smooth boundary.

IIB24t—26 to 41 inches; dark brown (7.5YR 4/4) clay loam; moderate medium prismatic structure; structure becomes coarser and texture becomes heavier; friable; few roots; thin discontinuous dark reddish brown (5YR 3/4) clay films on faces of peds; some pebbles present; slightly acid; clear wavy boundary.

IIIB31t—41 to 44 inches; yellowish red (5YR 4/6) silty clay; weak coarse subangular blocky structure; firm; few roots; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; some pebbles present; slightly acid; wavy boundary.

IIIB32t—44 to 47 inches; strong brown (7.5YR 5/6) clay; weak coarse subangular blocky structure; firm; thin

discontinuous reddish brown (5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.
IIIR—47 inches; brownish yellow (10YR 6/6) limestone bedrock.

The solum commonly is 40 to 50 inches thick, but it ranges to 60 inches in thickness. The limestone bedrock is at a depth ranging from 40 to 60 inches.

The A1 horizon in undisturbed areas is 2 to 5 inches thick and has color value of 2 or 3 and chroma of 1 or 2. The Ap horizon has color value of 4 or 5 and chroma of 2 or 3. The A horizon is most commonly silt loam, but, in some pedons, it is loam. There is a B1 horizon in some pedons. The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4. The IIB horizon has hue of 5YR to 10YR, and value and chroma of 3, 4, or 5. The IIB horizon is quite variable and is loam, sandy clay loam, clay loam, or sandy loam in the lower part of some pedons. The IIIB horizon has color value and chroma of 3 or 4. It commonly is 2 to 6 inches thick but ranges to 10 inches in thickness.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*6*). 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, nonacid, 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.

Formation of the soils

Seventy seven different kinds of soil are mapped in Ogle County. Soil differences vary as to kind and magnitude. These differences are attributed to at least five factors or causes: (1) Parent material in which soil is formed; (2) climatic conditions, especially rainfall and temperature; (3) plant and animal life associated with the soil, especially the native vegetation; (4) topography or slope of the land surface, as it influences the moisture condition of the soil and its natural drainage; and (5) the amount of time soil-development processes have been active and the rate or intensity of these processes. These major factors account for most of the differences among the soils of Ogle County. Their influence on the soil are discussed in the following sections.

Parent material and geological formation

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The parent material is the unconsolidated organic and mineral material in which soils form. It ranges from soft, transported sediments to residuum weathered in place from bedrock. It can be weathered or unweathered depending on previous history of the material and the geologic processes that produced the material. Common parent materials in glaciated areas are the sediments deposited by the action of glaciers, wind, and water. Also

included as parent material are paleosols, which are ancient soils or previously weathered materials.

The composition of parent materials varies greatly in chemical and mineralogical characteristics which are usually reflected in the soils. In youthful soils these characteristics determine the type of soil, but in some very strongly developed soils, the initial characteristics of the parent materials may not be detectable. In most soils alteration of the parent material is evident.

In Ogle County, the soils have formed in a variety of parent materials. The most common materials are loess (wind-blown silt, including some sand), glacial deposits, weathered bedrock, paleosols, and alluvium. All of the unconsolidated material overlying the bedrock is called drift which, in Ogle County, attains a maximum thickness of about 400 feet in the southeastern corner of the county (*3*). Drift is more than 100 feet thick in parts of eastern Ogle County, but is rarely more than 50 feet thick in central and western parts of the county. Bedrock is commonly exposed in the central one-third of the county. The exposed bedrock ranges from Silurian to Cambrian in age (*8*). Dolomite bedrock dominates the outcrop areas, and minor amounts of sandstone and a lesser amount of shale are in a few areas. Sogn, Ashdale, Palsgrove, and Whalan soils are terminated by bedrock. The nearly flat-lying Galena-Platteville Dolomite bedrock is exposed or underlies the drift in about 75 percent of the county. About 10 percent of the soil in Ogle County formed in residuum from bedrock.

Figure 13 is an idealized, east-west cross section to help explain the relationship of the soils to the parent materials in Ogle County. The figure is increasingly exaggerated toward the surface in order to emphasize the relative thickness of the uppermost parent material. Groups of soils are shown in the position relative to the upper parent material and the type of underlying material. Because of the wide variety of parent materials and the discontinuous nature of the underlying materials, the groups of soils can occur in numerous patterns. The pattern or sequence of soils across the county can vary from the one shown in figure 13 depending on the local geology. Past periods of severe geologic erosion have exposed many types of materials which have caused the variation in the patterns.

Loess and dune sand were deposited over the glacial deposits during the Wisconsinan Glaciation, 75,000 to 10,000 years ago. Two loess deposits are present in the county. The upper loess is called Peoria Loess and makes up more than 90 percent of the total loess. The lower loess is normally restricted to localities of thick deposits. Erosion has caused extreme variation in the thickness of the loess in the county. Total thickness of the loess ranges up to 15 feet in the western part of Ogle County but is commonly absent on steep slopes. In the eastern part of the county, the loess is 2 to 5 feet in thickness over most of the upland. About 25 percent of the soil area in Ogle County is in deep loess. Tama, Downs, and Fayette soils formed in Peoria Loess more than 5 feet thick.

Catlin, Flanagan, and Birkbeck soils formed in 40 to 60 inches of Peoria Loess over unweathered loam or finer textured till. Soils that have developed through a thin upper mantle into the underlying material are common in Ogle County. About 60 percent of the soil area in the county is developed in two or more parent materials.

Dune sand, shown as Parkland Sand Formation on figure 13, was blown out of Rock River Valley during the deposition of the Peoria Loess. The sand and loess are commonly interbedded east of the valley for several

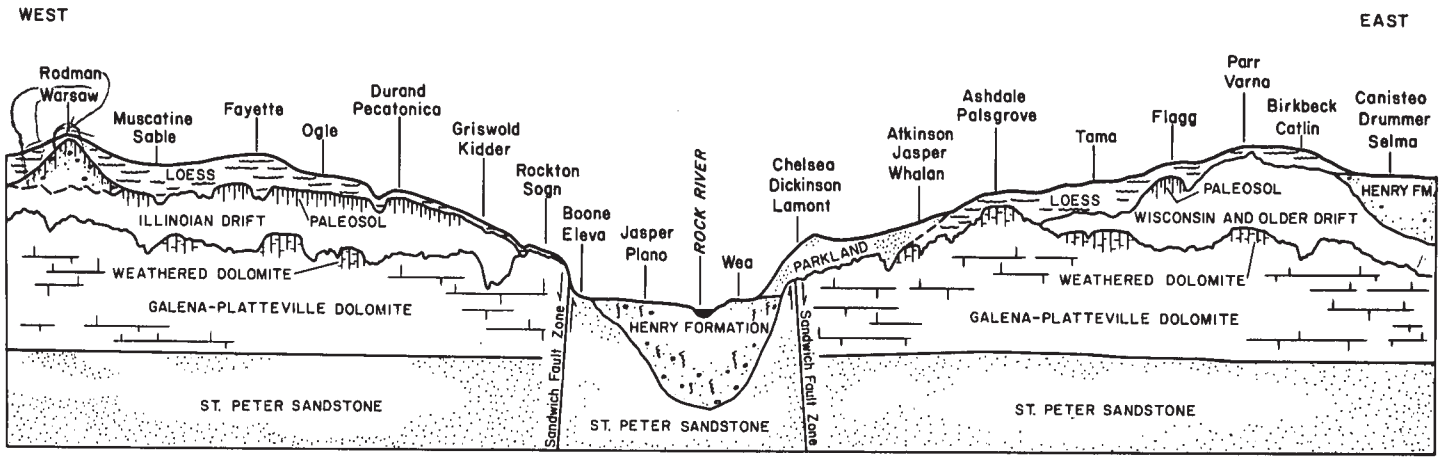

Figure 13.—Cross section showing the relationship of parent materials to the soils of Ogle County.

miles. The Parkland Sand Formation varies from sand to loam in texture. Lamont, Chelsea, and Dickinson soils are commonly formed on thick, sandy deposits. Jasper is an example of a soil formed in thick, loam-textured Parkland sand. Where the depth to dolomite bedrock is less than 5 feet, Atkinson and Whalan soils formed in the more sandy materials, whereas Palsgrove and Ashdale soils formed in loess. The upper part of the dolomite in these soils has weathered to a reddish colored clay. Where the weathered clay had been largely removed by erosion, the Sogn and Rockton soils formed in a thin, loamy material overlying the dolomite bedrock.

The area from the city of Oregon to the southeastern part of the county has been affected by faulting in the bedrock. Millions of years ago, forces within the earth broke up the rock, brought older rocks to the surface, and rearranged the order of the rocks. The faulted area is known as the Sandwich Fault Zone. The St. Peter Sandstone and older sandstone and dolomite formations are exposed in this area. The St. Peter Sandstone is also exposed in the Elkhorn Creek watershed. Eleva and Boone soils formed in sandy surface material over sandstone.

A significant amount of the parent material of the soils in Ogle County was produced by glaciers, which covered all of the county during the Illinoian Glaciation, about 150,000 years ago. Older glacial deposits are in the county, but the distribution is unknown. Younger Wisconsinan deposits are present in eastern Ogle County (*7*) but more recent, unpublished work by the Illinois Geological Survey has shown that the distribution is uncertain.

Most of the glacial deposits in Ogle County are tills, which are mixtures of clay, silt, sand gravel, and a few boulders, that were directly deposited from glaciers. Soils formed in glacial till cover about 18 percent of the county. Many types of till are found in Ogle County ranging from coarse (large amounts of sand and gravel) to fine (large amounts of silt and clay). Griswold and Kidder soils formed in coarse till, which is usually sandy loam in texture. La Rose, Miami, and Parr are examples of soils formed in a medium textured till, which is generally a loam in texture. The Varna soil formed in fine-textured till, which is usually silty clay loam or finer in texture. In many parts of Ogle County, the texture of the upper part of the till varies in texture from silty clay loam or clay loam to loam because of variation within the deposit or because of the outcrop of different till deposits. The cause of the variation is unknown. Many types of soils have formed on the intermediate or loamy deposits in which other soil-forming factors appear to be more important than the variation in the texture of the parent material. Most of the till-derived soils have a loess cover of a few inches to several feet, which explains some of the variation in the distribution of the different soil types.

Other types of glacial deposits are distributed throughout the county. These deposits are generally known as outwash, which have textures ranging from gravel to silt and some clay. They generally occur in hills, terraces, and lowlands. Outwash deposits in Ogle County are commonly interbedded with till deposits and generally are discontinuous deposits less than a few square miles in extent. In the county, outwash includes kames, eskers, glacial river and flood deposits, fans, deltas, and lake sediments. These deposits were primarily derived from the sediments carried by glacial meltwater. Typically, outwash grades from coarse textures in the base of the deposit to finer textures at the top. Rodman, Warsaw, and Wea are examples of soils formed in coarse outwash. Jasper, Plano, Drummer, Selma, and Canisteo are typical soils that have formed in the finer-textured outwash. The upper part of these soils contain some sediments that were deposited after the formation of the outwash. Soils formed in glacial outwash cover about 25 percent of the county.

The age of the outwash in Ogle County is of the Illinois or Wisconsin Glaciation. In many places on the uplands, a paleosol is present in the upper part of the Illinoian deposits, which affects the properties of the present soil.

A paleosol in outwash normally causes a reduction in permeability and an increase in water holding capacity when compared to unweathered outwash. The paleosol, however, has been removed by erosion at many localities allowing the underlying, unweathered Illinoian outwash to be exposed to the present soil-forming processes.

Wisconsinan outwash, Henry Formation, does not have a paleosol developed in it. The Henry Formation is confined to the lowlands in eastern Ogle County and the terraces in the Rock River Valley.

Paleosols are common parent materials in Ogle County. About 9 percent of the county contains paleosols that are under the Peoria Loess or the Parkland Sand that is less than five feet thick. Ogle, Myrtle, and Flagg are examples of soils formed in Peoria Loess, 40 to 60 inches thick, overlying a well drained, oxidized paleosol. Pecatonica and Durand soils formed in 20 to 40 inches of Peoria Loess overlying a well drained, oxidized paleosol. Generally confined to the sides or the heads of drainageways, Assumption and Elco soils developed in less than 40 inches of Peoria Loess overlying a gray, deoxidized paleosol. The gray paleosol was once a poorly drained soil that now is in the subsoil of a better drained soil. East of the Rock River Valley, the Parkland Sand covers the bedrock surface and isolated areas of glacial deposits. Westville and similar soils developed through thin, loamy Parkland sand into an oxidized paleosol (not shown on figure 13 because of scale).

Soils formed in alluvium cover about 10 percent of the county. Most of the larger valleys contain alluvium. Alluvium is restricted in many of the smaller valleys, because many stream segments are in process of downcutting and do not build floodplains. Radford and Huntsville are examples of soils formed in silty alluvium in small drainageways adjacent to Tama or Ogle soils, shown on

figure 13. Lawson and Sawmill soils are found in broader creek and river bottoms. Du Page, a common soil found along the Rock River, formed in loamy alluvium. Alluvium is not shown on figure 13 because of scale. In the Rock River Valley, the alluvium is confined close to the river and is only about 10 to 20 feet thick in most places, whereas the Henry Formation attains a maximum thickness of about 150 feet. Minor amounts of organic soils have formed on the larger flood plains and in depressions on the lowland.

Climate

Climate is an important soil-forming factor, because the kind and degree of weathering, which greatly affect soil horizons and their properties, are largely controlled by rainfall and temperature. Climate is also largely responsible for the type of native vegetation that grows on the soils. The humid-temperature climate of Ogle County favors the weathering and reduction in size of soil minerals and the formation and movement of clay downward in the soil profile, especially where parent materials have been in place for a long period of time. The prevailing rainfall has also influenced the removal, through leaching, of some of the basic elements and has replaced them with hydrogen. This has imparted varying degrees of acidity to horizons of the soil.

Plants and animals

The vegetation that grew in Ogle County prior to the time of settlement is responsible for some differences in soils, especially through the accumulation of organic matter and its influence on surface soil color. The dark-colored soils formed under native prairie grasses; the light-colored soils formed where forests, dominated by oak and hickory trees, grew for long periods of time. Some soils developed under mixed grass and forest or were forested for a relatively short time before being cleared; these soils have moderately dark-colored surfaces with intermediate organic matter content.

Animals that live on and in the soil have also influenced soil development but generally to a lesser extent than plants have. The activities of man—clearing forests, cultivating, fertilizing, draining, irrigating, and excavating and filling—have changed the course of soil formation. These activities have been recent enough, however, that their effects on soil development are not yet very apparent.

Topography and drainage

Topography influences water infiltration and percolation, runoff, and erosion in a given area. The moisture status of most soils in a given climate is largely controlled by topography and drainage. Where soils are developed in uniform, permeable, medium-textured materials such as loess, natural drainage is closely related to slope. Well drained and moderately well drained soils are on sloping areas, and somewhat poorly or poorly drained soils are on level areas or in depressions. In areas where sandy parent materials are very permeable, well drained soils are on all slopes and level areas, unless there is a permanently high water table. Conversely, poorly drained and somewhat poorly drained soils may be on slopes in areas that have slowly permeable parent materials, such as heavy till, which has a high clay content.

Level to sloping land surfaces, which dominate most of the upland areas of Ogle County, are conducive to the development of poorly drained and somewhat poorly drained soils that have a high water table.

On steep slopes, rainfall tends to run off rather than pass through the soil. This fact, coupled with the removal of materials under natural conditions on steep slopes, results in the development of soils that have a thin solum and weak profile development or horizonation.

Time

The evaluation of the time factor in soil development and formation is difficult because of the combined influence of other previously discussed factors of soil formation. The influence of time cannot be evaluated simply in years. A relatively "youthful" or slightly weathered soil and a relatively "old" or strongly weathered soil may develop in the same period of time if other factors of formation are quite different. If other formation factors are similar, however, soils are usually more strongly developed or weathered and have greater horizon differentiation if they have been exposed to soil formation processes over a longer time.

Soils are weathered and develop more rapidly in materials containing low rather than high amounts of carbonate, in permeable rather than slowly permeable materials, and under forest rather than grass vegetation.

The soils of Ogle County are dominately relatively "youthful."

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. Mineral or rock particles 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 slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

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.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in

layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

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 (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an 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.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

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.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous 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).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

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.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Paleosol. An ancient soil, typically buried, especially one developed during an interglacial period and covered by later deposits.

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.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 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, slope, 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.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called 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.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Sinkhole. A depression in the landscape where limestone has been dissolved.

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.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to 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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, 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.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

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 low lands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new

series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-75 at Rochelle, Ill.]

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days[1]	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	27.7	9.8	18.8	54	-20	0	1.41	0.62	2.04	4	7.6
February	32.1	14.6	23.4	54	-14	0	1.11	.46	1.63	3	7.4
March	42.9	24.6	33.8	74	- 1	21	2.24	1.19	3.09	6	6.5
April	59.2	37.1	48.2	84	16	55	3.76	2.62	4.80	7	1.1
May	71.2	47.6	59.5	91	29	314	3.48	2.14	4.67	7	.0
June	80.3	57.3	68.8	94	40	564	4.26	2.63	5.72	7	.0
July	83.3	60.9	72.1	96	45	685	4.29	2.49	5.75	7	.0
August	81.9	59.3	70.7	94	42	642	3.19	1.61	4.47	6	.0
September	74.9	51.4	63.2	91	32	396	3.37	1.27	5.05	6	.0
October	64.6	41.7	53.2	86	22	177	2.78	.76	4.38	5	.2
November	47.4	29.4	38.4	73	8	0	2.10	1.21	2.82	5	1.5
December	33.5	17.2	25.4	63	-13	0	1.85	.80	2.71	5	8.5
Yearly:											
Average	58.3	37.6	48.0	---	---	---	---	---	---	---	---
Extreme	---	---	---	96	-23	---	---	---	---	---	---
Total	---	---	---	---	---	2,854	33.84	28.55	38.60	68	32.8

[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 (50° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-75 at Rochelle, Ill.]

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 24	May 3	May 16
2 years in 10 later than--	April 19	April 28	May 11
5 years in 10 later than--	April 9	April 20	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	October 15	October 10	September 26
2 years in 10 earlier than--	October 20	October 15	October 1
5 years in 10 earlier than--	October 31	October 24	October 12

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-75 at Rochelle, Ill.]

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	183	168	142
8 years in 10	190	175	149
5 years in 10	204	186	162
2 years in 10	219	199	177
1 year in 10	228	207	186

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
21B	Pecatonica silt loam, 2 to 5 percent slopes	591	0.1
21C2	Pecatonica silt loam, 5 to 10 percent slopes, eroded	3,847	0.8
21D2	Pecatonica silt loam, 10 to 15 percent slopes, eroded	600	0.1
22C2	Westville silt loam, 5 to 10 percent slopes, eroded	755	0.2
22D2	Westville silt loam, 10 to 15 percent slopes, eroded	438	0.1
24B	Dodge silt loam, 2 to 5 percent slopes	778	0.2
24C2	Dodge silt loam, 5 to 10 percent slopes, eroded	1,273	0.3
27B	Miami loam, 2 to 5 percent slopes	446	0.1
27C2	Miami loam, 5 to 10 percent slopes, eroded	6,128	1.3
27D2	Miami loam, 10 to 15 percent slopes, eroded	2,433	0.5
27E2	Miami loam, 15 to 20 percent slopes, eroded	477	0.1
29D2	Dubuque silt loam, 7 to 15 percent slopes, eroded	789	0.2
36A	Tama silt loam, 0 to 2 percent slopes	6,985	1.4
36B	Tama silt loam, 2 to 5 percent slopes	53,078	10.8
36C2	Tama silt loam, 5 to 10 percent slopes, eroded	14,238	2.9
41	Muscatine silt loam	9,912	2.0
55B	Sidell silt loam, 2 to 5 percent slopes	1,319	0.3
60C2	La Rose silt loam, 5 to 10 percent slopes, eroded	848	0.2
61	Atterberry silt loam	1,714	0.4
68	Sable silty clay loam	2,463	0.5
73	Ross loam	1,088	0.2
74	Radford silt loam	6,510	1.3
77	Huntsville silt loam	1,514	0.3
82	Millington silt loam	501	0.1
87B	Dickinson sandy loam, 1 to 5 percent slopes	2,740	0.6
87C	Dickinson sandy loam, 5 to 12 percent slopes	559	0.1
88B	Sparta loamy sand, 0 to 6 percent slopes	727	0.1
102	La Hogue loam	6,874	1.4
103	Houghton muck	264	0.1
105B	Batavia silt loam, 1 to 5 percent slopes	827	0.2
107	Sawmill silty clay loam	2,158	0.4
119C2	Elco silt loam, 5 to 10 percent slopes, eroded	642	0.1
123	Riverwash	305	0.1
125	Selma clay loam	9,789	2.0
145B	Saybrook silt loam, 2 to 5 percent slopes	7,501	1.5
145C2	Saybrook silt loam, 5 to 10 percent slopes, eroded	5,415	1.1
152	Drummer silty clay loam	20,919	4.2
154A	Flanagan silt loam, 0 to 3 percent slopes	2,820	0.6
171A	Catlin silt loam, 0 to 2 percent slopes	1,458	0.3
171B	Catlin silt loam, 2 to 5 percent slopes	14,130	2.9
171C2	Catlin silt loam, 5 to 10 percent slopes, eroded	6,398	1.3
175B	Lamont sandy loam, 1 to 5 percent slopes	1,240	0.3
175C	Lamont sandy loam, 5 to 12 percent slopes	607	0.1
198	Elburn silt loam	13,796	2.8
199A	Plano silt loam, 0 to 2 percent slopes	7,556	1.5
199B	Plano silt loam, 2 to 5 percent slopes	11,186	2.3
199C2	Plano silt loam, 5 to 10 percent slopes, eroded	3,199	0.7
219	Millbrook silt loam	1,262	0.3
221B	Parr loam, 2 to 5 percent slopes	7,187	1.5
221C2	Parr loam, 5 to 10 percent slopes, eroded	7,590	1.6
223B	Varna silt loam, 2 to 5 percent slopes	713	0.1
223C2	Varna silt loam, 5 to 10 percent slopes, eroded	504	0.1
233B	Birkbeck silt loam, 2 to 5 percent slopes	2,489	0.5
233C2	Birkbeck silt loam, 5 to 10 percent slopes, eroded	2,709	0.6
242A	Kendall silt loam, 0 to 3 percent slopes	993	0.2
243A	St.Charles silt loam, 0 to 2 percent slopes	566	0.1
243B	St.Charles silt loam, 2 to 5 percent slo pes	3,360	0.7
243C2	St.Charles silt loam, 5 to 10 percent slopes, eroded	1,826	0.4
259B	Assumption silt loam, 2 to 5 percent slopes	485	0.1
259C2	Assumption silt loam, 5 to 10 percent slopes, eroded	2,597	0.5
278A	Stronghurst silt loam, 0 to 3 percent slopes	851	0.2
279A	Rozetta silt loam, 0 to 3 percent slopes	1,289	0.3
280B	Fayette silt loam, 2 to 5 percent slopes	11,831	2.4
280C2	Fayette silt loam, 5 to 10 percent slopes, eroded	7,168	1.5
280D2	Fayette silt loam, 10 to 15 percent slopes, eroded	394	0.1
290B	Warsaw loam, 1 to 5 percent slopes	1,171	0.2
294B	Symerton loam, 1 to 5 percent slopes	265	0.1
294C2	Symerton loam, 5 to 10 percent slopes, eroded	205	*
321	Du Page silt loam	1,145	0.2
324B	Ripon silt loam, 2 to 5 percent slopes	436	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
324C2	Ripon silt loam, 5 to 10 percent slopes, eroded	883	0.2
327B	Fox loam, 1 to 5 percent slopes	241	*
347	Canisteo clay loam	3,882	0.8
361B	Kidder loam, 2 to 5 percent slopes	482	0.1
361C2	Kidder loam, 5 to 10 percent slopes, eroded	2,968	0.6
361D2	Kidder loam, 10 to 15 percent slopes, eroded	855	0.2
363B	Griswold loam, 2 to 5 percent slopes	1,992	0.4
363C2	Griswold loam, 5 to 10 percent slopes, eroded	3,779	0.8
386A	Downs silt loam, 0 to 2 percent slopes	686	0.1
386B	Downs silt loam, 2 to 5 percent slopes	13,869	2.8
387A	Ockley silt loam, 0 to 2 percent slopes	364	0.1
387B	Ockley silt loam, 2 to 5 percent slopes	425	0.1
397B	Boone sand, 2 to 7 percent slopes	208	*
397D	Boone sand, 7 to 15 percent slopes	840	0.2
397F	Boone sand, 15 to 45 percent slopes	2,703	0.6
398A	Wea silt loam, 0 to 2 percent slopes	1,174	0.2
398B	Wea silt loam, 2 to 5 percent slopes	690	0.1
410B	Woodbine silt loam, 2 to 5 percent slopes	234	*
410C2	Woodbine silt loam, 5 to 10 percent slopes, eroded	699	0.1
411B	Ashdale silt loam, 2 to 5 percent slopes	6,359	1.3
411C2	Ashdale silt loam, 5 to 10 percent slopes, eroded	4,023	0.8
412B	Ogle silt loam, 2 to 5 percent slopes	11,864	2.4
412C2	Ogle silt loam, 5 to 10 percent slopes, eroded	5,751	1.2
414B	Myrtle silt loam, 2 to 5 percent slopes	2,410	0.5
415	Orion silt loam	2,346	0.5
416B	Durand silt loam, 2 to 5 percent slopes	533	0.1
416C2	Durand silt loam, 5 to 10 percent slopes, eroded	1,430	0.3
419B	Flagg silt loam, 2 to 5 percent slopes	4,714	1.0
419C2	Flagg silt loam, 5 to 10 percent slopes, eroded	2,753	0.6
429B	Palsgrove silt loam, 2 to 5 percent slopes	2,016	0.4
429C2	Palsgrove silt loam, 5 to 10 percent slopes, eroded	2,427	0.5
440A	Jasper loam, 0 to 2 percent slopes	6,748	1.4
440B	Jasper loam, 2 to 5 percent slopes	16,701	3.3
440C2	Jasper loam, 5 to 10 percent slopes, eroded	2,345	0.5
451	Lawson silt loam	15,369	3.1
490	Odell loam	2,765	0.6
503B	Rockton silt loam, 2 to 5 percent slopes	2,357	0.5
503C2	Rockton silt loam, 5 to 10 percent slopes, eroded	3,657	0.7
504D	Sogn loam, 7 to 15 percent slopes	4,027	0.8
504F	Sogn loam, 15 to 45 percent slopes	3,418	0.7
505C2	Dunbarton silty clay loam, 5 to 12 percent slopes, eroded	279	0.1
505E2	Dunbarton silty clay loam, 12 to 20 percent slopes, eroded	297	0.1
509B	Whalan loam, 2 to 5 percent slopes	598	0.1
509C2	Whalan loam, 5 to 10 percent slopes, eroded	4,813	1.0
509D2	Whalan loam, 10 to 15 percent slopes, eroded	2,202	0.5
509E2	Whalan loam, 15 to 30 percent slopes, eroded	1,344	0.3
570A	Martinsville silt loam, 0 to 2 percent slopes	1,315	0.3
570B	Martinsville silt loam, 2 to 5 percent slopes	6,436	1.3
570C2	Martinsville silt loam, 5 to 10 percent slopes, eroded	3,511	0.7
570D2	Martinsville silt loam, 10 to 15 percent slopes, eroded	1,180	0.2
661B	Atkinson silt loam, 2 to 5 percent slopes	1,148	0.2
661C2	Atkinson silt loam, 5 to 10 percent slopes, eroded	275	0.1
727B	Waukee loam, 1 to 5 percent slopes	860	0.2
728C2	Winnebago silt loam, 5 to 10 percent slopes, eroded	384	0.1
742B	Dickinson sandy loam, loamy substratum, 1 to 5 percent slopes	2,258	0.5
742C	Dickinson sandy loam, loamy substratum, 5 to 12 percent slopes	461	0.1
761B	Eleva sandy loam, 2 to 7 percent slopes	550	0.1
761D	Eleva sandy loam, 7 to 15 percent slopes	1,187	0.2
761F	Eleva sandy loam, 15 to 35 percent slopes	687	0.1
776	Comfrey clay loam	8,366	1.7
779B	Chelsea loamy sand, 1 to 7 percent slopes	711	0.1
779D	Chelsea loamy sand, 7 to 15 percent slopes	1,286	0.3
802	Orthents, loamy	1,253	0.3
864	Pits, quarries	525	0.1
865	Pits, gravel	467	0.1
919C	Rodman-Fox complex, 5 to 12 percent slopes	768	0.2
919E	Rodman-Fox complex, 12 to 20 percent slopes	617	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
939C	Rodman-Warsaw complex, 5 to 12 percent slopes	773	0.2
939E	Rodman-Warsaw complex, 12 to 20 percent slopes	361	0.1
4776	Comfrey clay loam, ponded	549	0.1
6506B	Hitt Variant sandy loam, 2 to 5 percent slopes	666	0.1
6506C	Hitt Variant sandy loam, 5 to 10 percent slopes	495	0.1
	Water	3,840	0.8
	Total	488,320	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
	Bu	Bu	Bu	Bu	Ton	AUM*
21B---------- Pecatonica	117	35	49	64	4.7	7.8
21C2---------- Pecatonica	111	33	46	61	4.4	7.4
21D2---------- Pecatonica	106	32	44	59	4.2	7.0
22C2---------- Westville	107	33	44	60	3.9	6.6
22D2---------- Westville	103	32	42	58	3.8	6.3
24B---------- Dodge	125	41	63	69	5.0	8.4
24C2---------- Dodge	118	38	51	66	4.8	8.0
27B---------- Miami	120	40	51	67	4.8	7.9
27C2---------- Miami	114	38	48	64	4.5	7.5
27D2---------- Miami	109	36	46	61	4.3	7.2
27E2---------- Miami	102	34	43	57	4.0	6.7
29D2---------- Dubuque	75	23	32	48	3.1	5.1
36A---------- Tama	155	46	62	89	5.9	9.8
36B---------- Tama	153	46	61	88	5.8	9.7
36C2---------- Tama	146	43	58	84	5.5	9.2
41---------- Muscatine	167	51	64	95	6.2	10.3
55B---------- Sidell	136	45	57	79	5.4	9.1
60C2---------- La Rose	116	39	49	70	4.5	7.5
61---------- Atterberry	149	44	60	85	5.6	9.3
68---------- Sable	156	51	61	85	5.6	9.3
73---------- Ross	145	46	60	80	5.5	9.2

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
	Bu	Bu	Bu	Bu	Ton	AUM*
74---------- Radford	143	46	61	84	5.6	9.3
77---------- Huntsville	152	48	64	86	5.8	9.6
82---------- Millington	133	41	52	68	4.6	7.7
87B---------- Dickinson	98	37	45	76	3.9	6.4
87C---------- Dickinson	96	36	44	75	3.8	6.3
88B---------- Sparta	84	29	37	52	3.3	3.5
102---------- La Hogue	129	43	56	80	5.2	8.6
103---------- Houghton	129	44	---	---	---	7.3
105B---------- Batavia	137	43	54	80	5.3	8.9
107---------- Sawmill	147	47	54	76	5.5	9.2
119C2---------- Elco	105	35	44	60	4.1	6.9
123**. Riverwash						
125---------- Selma	136	44	53	76	5.0	8.3
145B---------- Saybrook	138	46	59	83	5.5	9.2
145C2---------- Saybrook	130	43	56	79	5.3	8.7
152---------- Drummer	154	51	61	83	5.5	9.2
154A---------- Flanagan	162	52	67	92	6.1	10.2
171A---------- Catlin	150	46	61	87	5.8	9.7
171B---------- Catlin	149	46	60	86	5.7	9.6
171C2---------- Catlin	141	43	57	82	5.5	9.1
175B---------- Lamont	96	36	45	76	3.7	6.1
175C---------- Lamont	94	35	44	75	3.6	6.0
198---------- Elburn	161	50	63	94	6.1	10.2
199A---------- Plano	151	45	60	90	5.8	9.7

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
	Bu	Bu	Bu	Bu	Ton	AUM*
199B---------- Plano	151	45	60	90	5.8	9.7
199C2---------- Plano	143	43	57	86	5.5	9.2
219---------- Millbrook	144	43	59	81	5.4	9.0
221B---------- Parr	128	44	56	77	5.2	8.7
221C2---------- Parr	114	41	54	73	5.0	8.3
223B---------- Varna	122	41	52	74	4.8	7.9
223C2---------- Varna	116	38	50	71	4.5	7.5
233B---------- Birkbeck	122	41	54	69	5.0	8.2
233C2---------- Birkbeck	116	38	52	66	4.7	7.8
242A---------- Kendall	135	41	55	75	5.2	8.7
243A---------- St. Charles	127	40	56	73	5.1	8.5
243B---------- St. Charles	126	40	55	72	5.0	8.4
243C2---------- St. Charles	119	38	53	69	4.8	8.0
259B---------- Assumption	127	39	55	76	5.0	8.2
259C2---------- Assumption	120	37	53	72	4.7	7.8
278A---------- Stronghurst	138	42	55	76	5.3	8.8
279A---------- Rozetta	131	40	54	73	5.2	8.7
280B---------- Fayette	128	39	52	72	5.1	8.6
280C2---------- Fayette	121	37	50	69	4.9	8.2
280D2---------- Fayette	116	35	48	66	4.7	7.7
290B---------- Warsaw	114	40	52	73	4.6	7.6
294B---------- Symerton	135	44	58	82	5.3	8.9
294C2---------- Symerton	128	41	55	78	5.1	8.5

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
	Bu	Bu	Bu	Bu	Ton	AUM*
321---------- Du Page	132	40	53	70	5.0	8.0
324B---------- Ripon	105	39	46	71	4.4	7.2
324C2---------- Ripon	100	37	43	68	4.1	6.9
327B---------- Fox	105	33	46	63	4.3	7.1
347---------- Canisteo	132	44	53	77	5.3	8.8
361B---------- Kidder	100	35	45	66	4.1	6.7
361C2---------- Kidder	95	33	42	63	3.9	6.4
361D2---------- Kidder	91	32	41	60	3.7	6.1
363B---------- Griswold	111	41	55	75	4.8	7.9
363C2---------- Griswold	105	39	53	71	4.5	7.5
386A---------- Downs	148	43	59	83	5.6	9.3
386B---------- Downs	147	43	58	82	5.5	9.2
387A---------- Ockley	126	42	51	75	5.0	8.3
387B---------- Ockley	125	42	50	74	5.0	8.2
397B---------- Boone	50	18	25	37	2.5	4.2
397D---------- Boone	---	---	---	25	1.5	---
397F---------- Boone	---	---	---	---	---	---
398A---------- Wea	144	47	61	80	5.5	9.2
398B---------- Wea	143	47	60	79	5.4	9.1
410B---------- Woodbine	101	35	45	59	3.9	6.4
410C2---------- Woodbine	96	33	42	56	3.7	6.1
411B---------- Ashdale	115	39	52	73	5.0	8.2
411C2---------- Ashdale	109	37	50	70	4.7	7.8

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
	Bu	Bu	Bu	Bu	Ton	AUM*
412B---- Ogle	139	36	47	68	4.5	7.4
412C2---- Ogle	132	32	41	62	4.0	6.8
424B---- Myrtle	124	36	44	64	4.2	6.9
415---- Orion	135	---	---	75	4.5	---
416B---- Durand	129	44	57	72	4.7	8.0
416C2---- Durand	122	40	52	66	4.3	7.4
419B---- Flagg	120	33	40	58	4.0	6.6
419C2---- Flagg	114	28	36	52	3.6	6.0
429B---- Palsgrove	107	32	---	55	3.7	6.0
429C2---- Palsgrove	101	24	---	47	3.5	5.5
440A---- Jasper	138	46	52	---	4.3	---
440B---- Jasper	137	44	50	---	4.1	---
440C2---- Jasper	130	42	48	---	4.0	---
451---- Lawson	161	---	---	80	4.0	---
490---- Odell	143	46	58	---	4.3	---
503B---- Rockton	108	26	---	65	4.0	5.6
503C2---- Rockton	102	22	---	57	3.5	4.9
504D, 504F---- Sogn	---	---	---	---	---	---
505C2---- Dunbarton	66	---	---	60	3.0	---
505E2---- Dunbarton	---	---	---	---	2.7	---
509B---- Whalan	97	28	40	71	4.2	6.9

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
	Bu	Bu	Bu	Bu	Ton	AUM*
509C2---------- Whalan	92	26	38	68	3.9	6.6
509D2---------- Whalan	88	25	36	65	3.8	6.3
509E2---------- Whalan	---	---	---	---	3.2	5.4
570A---------- Martinsville	121	37	51	66	4.8	8.0
570B---------- Martinsville	120	37	50	65	4.8	7.9
570C2---------- Martinsville	114	35	48	62	4.5	7.5
570D2---------- Martinsville	109	33	46	59	4.3	7.2
661B---------- Atkinson	119	39	49	67	4.8	7.9
661C2---------- Atkinson	113	37	46	64	4.5	7.5
727B---------- Waukee	102	35	46	65	4.1	6.9
728C2---------- Winnebago	114	38	48	64	4.5	7.5
742B---------- Dickinson	108	36	49	68	4.4	7.3
742C---------- Dickinson	102	34	46	65	4.1	6.9
761B---------- Eleva	65	20	23	37	2.4	4.0
761D---------- Eleva	60	---	---	---	2.2	3.6
761F---------- Eleva	---	---	---	---	1.8	3.0
776---------- Comfrey	140	46	51	66	5.0	8.3
779B---------- Chelsea	65	23	34	46	2.5	4.2
779D---------- Chelsea	---	---	---	41	2.3	3.9
802**. Orthents						
864**, 865**. Pits						
919C---------- Rodman	---	---	---	---	2.3	3.8

See footnotes 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
	Bu	Bu	Bu	Bu	Ton	AUM*
919E---------- Rodman	---	---	---	---	2.0	3.4
939C, 939E---------- Rodman	---	---	---	---	2.1	3.5
4776---------- Comfrey	---	---	---	---	---	---
6506B---------- Hitt Variant	107	40	47	64	4.4	7.4
6506C---------- Hitt Variant	105	39	46	63	4.4	7.3

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 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				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
21B, 21C2, 21D2---- Pecatonica	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black walnut--------	80 80 ---	White oak, black walnut, northern red oak, green ash, sugar maple, eastern white pine, red pine.
22C2, 22D2--------- Westville	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black walnut--------	80 80 ---	White oak, black walnut, northern red oak, green ash, sugar maple, eastern white pine, red pine.
24B, 24C2---------- Dodge	2o	Slight	Slight	Slight	Slight	Northern red oak---- Black cherry-------- White oak----------	75 --- ---	Eastern white pine, black walnut, red pine, northern red oak, green ash, sugar maple.
27B, 27C2, 27D2, 27E2---------- Miami	1o	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Sweetgum----------	90 98 76	Eastern white pine, red pine, northern red oak, white ash, green ash, sugar maple, black walnut, black locust.
29D2--------------- Dubuque	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak----------	75 75	Eastern white pine, red pine, northern red oak, green ash, eastern redcedar.
55B---------------- Sidell	---	---	---	---	---		---	Eastern white pine, red pine, white ash, green ash, black walnut, black locust.
60C2--------------- La Rose	---	---	---	---	---		---	Black walnut, northern red oak, green ash, white ash, eastern white pine, red pine, white oak, sugar maple.
61----------------- Atterberry	3o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Green ash---------- Bur oak----------	70 70 --- ---	Eastern white pine, red pine, eastern redcedar.
68----------------- Sable	---	---	---	---	---		---	Pin oak, green ash, European larch, swamp white oak, American sycamore, common hackberry, red maple, eastern cottonwood.

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	
73---------- Ross	1o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Sugar maple----------	85 95 85	Eastern white pine, black walnut, white oak, white ash, northern red oak, sugar maple, red pine.
74---------- Radford	---	---	---	---	---		---	Green ash, northern red oak, eastern white pine, American sycamore, red pine, white oak, eastern cottonwood.
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.
82---------- Millington	---	---	---	---	---		---	Black spruce, American sycamore, pin oak, swamp white oak, green ash, common hackberry, European larch, red maple.
87B, 87C---------- Dickinson	---	---	---	---	---		---	Eastern white pine, red pine, white ash.
88B---------- Sparta	3s	Slight	Slight	Severe	Slight	Northern red oak---- Red pine------------ Eastern white pine-- Jack pine-----------	70 --- --- ---	Eastern white pine, red pine.
102---------- La Hogue	---	---	---	---	---		---	American sycamore, eastern cottonwood, green ash, white oak, northern red oak, eastern white pine.
103---------- Houghton	3w	Slight	Severe	Severe	Severe	Red maple---------- Silver maple-------- White ash---------- Quaking aspen------- Tamarack------------ Green ash---------- Northern white-cedar	51 76 51 56 45 --- 27	
105B---------- Batavia	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, sugar maple.
107---------- Sawmill	---	---	---	---	---		---	Black spruce, American sycamore, green ash, common hackberry, pin oak, swamp white oak, European larch, red maple.

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	
119C2--------- Elco	2o	Slight	Slight	Slight	Slight	White oak----------	80	White oak, northern red oak, black walnut, green ash, eastern white pine, red pine, black locust, sugar maple.
						Northern red oak----	---	
						Black walnut--------	---	
125--------- Selma	---	---	---	---	---		---	Pin oak, American sycamore, green ash, common hackberry, European larch, swamp white oak, black spruce, red maple.
145B, 145C2------- Saybrook	---	---	---	---	---		---	Black walnut, green ash, sugar maple, white oak, eastern white pine, red pine, northern red oak.
152--------- Drummer	---	---	---	---	---		---	Eastern cottonwood, American sycamore, red maple, swamp white oak, green ash, red maple, pin oak, common hackberry.
154A--------- Flanagan	---	---	---	---	---		---	American sycamore, eastern cottonwood, green ash, northern red oak, white oak, eastern white pine.
171A, 171B, 171C2-- Catlin	---	---	---	---	---		---	Black walnut, northern red oak, green ash, white oak, sugar maple, eastern white pine, red pine, white ash.
175B, 175C--------- Lamont	3o	Slight	Slight	Slight	Slight	Northern red oak----	70	Eastern white pine, red pine, eastern redcedar.
						White oak----------	65	
198--------- Elburn	---	---	---	---	---		---	American sycamore, eastern cottonwood, green ash, northern red oak, white oak, eastern white pine.
199A, 199B, 199C2-- Plano	---	---	---	---	---		---	Black walnut, eastern white pine, red pine, white oak green ash, sugar maple, northern red oak.
219--------- Millbrook	2o	Slight	Slight	Slight	Slight	White oak----------	80	White oak, eastern white pine, red pine, northern red oak, green ash, sugar maple.
						Northern red oak----	80	
						Yellow-poplar-------	90	
						Black walnut--------	---	

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	
221B, 221C2-------- Parr	---	---	---	---	---		---	Eastern white pine, red pine, northern red oak, white ash, white oak, sugar maple, black walnut.
223B, 223C2-------- Varna	---	---	---	---	---		---	Eastern redcedar, jack pine.
233B, 233C2-------- Birkbeck	1o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Green ash----------	85 --- ---	White oak, northern red oak, green ash, black walnut, eastern white pine, red pine, sugar maple.
242A--------------- Kendall	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Yellow-poplar------- Black walnut--------	80 80 90 ---	White oak, sugar maple, northern red oak, green ash, eastern white pine, red pine.
243A, 243B, 243C2-- St. Charles	1o	Slight	Slight	Slight	Slight	Yellow-poplar------- White oak---------- Northern red oak---- Sweetgum---------- Green ash----------	96 85 86 --- ---	White oak, northern red oak, black walnut, green ash, sugar maple, eastern white pine, red pine.
259B, 259C2-------- Assumption	---	---	---	---	---		---	Black walnut, white oak, green ash, northern red oak, sugar maple, eastern white pine.
278A--------------- Stronghurst	3o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Green ash---------- Bur oak----------	70 70 --- ---	Eastern white pine, red pine, eastern redcedar.
279A--------------- Rozetta	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Yellow-poplar------- Black walnut--------	80 80 90 ---	Eastern white pine, northern red oak, green ash, white oak, sugar maple, red pine.
280B, 280C2, 280D2- Fayette	2o	Slight	Slight	Slight	Slight	White oak---------- northern red oak----	75 80	Eastern white pine, red pine, white oak, Northern red oak, green ash, black walnut, sugar maple.
290B--------------- Warsaw	---	---	---	---	---		---	Eastern white pine, green ash, northern red oak, black walnut, white oak, white ash, sugar maple.
294B, 294C2-------- Symerton	---	---	---	---	---		---	White oak, black walnut, northern red oak, green ash, sugar maple, 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	
321---------- Du Page	---	---	---	---	---		---	Eastern white pine, northern red oak, black walnut, green ash, sugar maple, white oak.
327B---------- Fox	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Sugar maple---------	80 --- ---	White ash, northern red oak, eastern white pine, red pine, white oak, black locust.
361B, 361C2-------- Kidder	2o	Slight	Slight	Slight	Slight	Northern red oak---- White ash----------	80 ---	Eastern white pine, northern red oak, red pine, white ash, white oak.
361D2---------- Kidder	2r	Moderate	Moderate	Moderate	Slight	Northern red oak---- White ash----------	80 ---	Eastern white pine, northern red oak, red pine, white ash, white oak, black locust, eastern redcedar.
363B, 363C2-------- Griswold	---	---	---	---	---		---	Black walnut, eastern white pine, sugar maple, green ash, white oak, northern red oak.
386A, 386B--------- Downs	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak----	85 75	Eastern white pine, red pine, white oak, green ash, northern red oak, black walnut, sugar maple.
387A, 387B--------- Ockley	1o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Yellow-poplar------- Sweetgum----------	90 90 98 76	Eastern white pine, red pine, white oak, white ash, sugar maple, black walnut, black locust.
397B, 397D--------- Boone	3s	Slight	Slight	Severe	Slight	Jack pine---------- Northern pin oak---- Black oak----------	55 --- ---	Red pine, eastern redcedar, jack pine, black locust, eastern white pine.
397F---------- Boone	3s	Moderate	Severe	Severe	Slight	Jack pine---------- Northern pin oak---- Black oak----------	55 --- ---	Red pine, black locust, jack pine, eastern redcedar.
398A, 398B--------- Wea	---	---	---	---	---		---	Eastern white pine, green ash, black walnut, northern red oak, sugar maple, white ash.
410B, 410C2-------- Woodbine	3o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Bur oak---------- Green ash----------	70 70 --- ---	Eastern white pine, red pine, jack pine, black locust, eastern redcedar.

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	
411B, 411C2-------- Ashdale	---	---------	---------	---------	---------		---	Black walnut, northern red oak, white ash, green ash, white oak, eastern white pine, sugar maple.
412B, 412C2-------- Ogle	---	---------	---------	---------	---------		---	Black walnut, sugar maple, green ash, northern red oak, white ash, eastern white pine, white oak.
414B---------- Myrtle	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black walnut---------	80 80 ---	White oak, northern red oak, black walnut, green ash, eastern white pine, red pine, sugar maple.
415---------- Orion	3w	Slight	Moderate	Slight	Slight	Silver maple-------- Eastern cottonwood-- White ash----------	80 --- ---	American sycamore, pin oak, red maple, swamp white oak, eastern cottonwood.
416B, 416C2-------- Durand	---	---------	---------	---------	---------		---	Black walnut, green ash, northern red oak, white oak, sugar maple, eastern white pine.
419B, 419C2-------- Flagg	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black walnut---------	80 80 ---	White oak, northern red oak, black walnut, green ash, eastern white pine, red pine, sugar maple.
429B, 429C2-------- Palsgrove	3o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Green ash---------- Bur oak----------	70 70 --- ---	Eastern white pine, black locust, eastern redcedar, red pine.
440A, 440B, 440C2-- Jasper	---	---------	---------	---------	---------		---	Eastern white pine, green ash, white ash, northern red oak, white oak, black walnut, sugar maple.
451---------- Lawson	4o	Slight	Slight	Slight	Slight	Silver maple-------- White ash---------- American elm--------	70 --- ---	Eastern white pine, eastern redcedar, red pine, black locust, jack pine.
490---------- Odell	---	---------	---------	---------	---------		---	Eastern white pine, green ash, eastern cottonwood, northern red oak, white oak, American sycamore.

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	
505C2-------------- Dunbarton	3d	Slight	Slight	Moderate	Moderate	Northern red oak---- Black oak---------- White oak---------- Shagbark hickory----	60 --- --- ---	Eastern white pine, jack pine, eastern redcedar, red pine.
505E2-------------- Dunbarton	3d	Severe	Moderate	Moderate	Moderate	Northern red oak---- Black oak---------- White oak---------- Shagbark hickory----	60 --- --- ---	Eastern white pine, jack pine, eastern redcedar, red pine.
509B, 509C2, 509D2-- Whalan	2o	Slight	Slight	Slight	Slight	Eastern white pine-- Northern red oak---- White oak---------- Black walnut--------	70 80 75 55	Northern red oak, white oak, green ash, red pine, eastern white pine.
509E2-------------- Whalan	3r	Moderate	Moderate	Moderate	Slight	Eastern white pine-- Northern red oak---- American basswood--- Bur oak----------	70 80 75 52	Eastern redcedar, red pine, eastern white pine, black locust.
570A, 570B, 570C2, 570D2---------- Martinsville	1o	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Sweetgum----------	90 98 76	Eastern white pine, red pine, northern red oak, white ash, sugar maple, white oak, black walnut.
728C2-------------- Winnebago	---	---	---	---	---		---	Black walnut, northern red oak, green ash, white oak, sugar maple, eastern white pine.
761B, 761D--------- Eleva	3o	Slight	Slight	Slight	Slight	Jack pine---------- Black oak---------- Northern red oak----	60 50 ---	Jack pine, eastern white pine, red pine, eastern redcedar.
761F--------------- Eleva	3r	Moderate	Moderate	Moderate	Slight	Jack pine---------- Black oak---------- Northern red oak----	60 50 ---	Jack pine, eastern white pine, red pine, eastern redcedar.
779B, 779D--------- Chelsea	3s	Slight	Slight	Moderate	Slight	White oak----------	55	Eastern white pine, eastern redcedar, red pine, jack pine.
919C*: Rodman-----------	3s	Slight	Slight	Severe	Slight	Northern red oak---- White oak---------- Red pine---------- Eastern white pine--	70 70 75 85	Eastern white pine, red pine, eastern redcedar, jack pine.
Fox-----------------	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Sugar maple---------	80 --- ---	White ash, northern red oak, eastern white pine, red pine, white oak, black locust.
919E*: Rodman-----------	3s	Slight	Slight	Severe	Slight	Northern red oak---- White oak---------- Red pine---------- Eastern white pine--	70 70 75 85	Eastern white pine, red pine, eastern redcedar, jack 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	
919E*:								
Fox	2r	Moderate	Moderate	Slight	Slight	Northern red oak White oak Sugar maple	80 --- ---	White ash, northern red oak, eastern white pine, red pine, white oak, black locust.
939C*, 939E*:								
Rodman	3s	Slight	Slight	Severe	Slight	Northern red oak White oak Red pine Eastern white pine	70 70 75 85	Eastern white pine, red pine, eastern redcedar, jack pine.
Warsaw	---	---	---	---	---		---	Eastern white pine, green ash, red pine, northern red oak, black walnut, white oak, white ash, sugar maple.
6506B, 6506C Hitt Variant	---	---	---	---	---		---	Northern red oak, green ash, eastern white pine, white ash, white oak, sugar maple.

* 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 heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
21B, 21C2, 21D2--- Pecatonica	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Amur maple, eastern redcedar, flowering dogwood.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
22C2, 22D2--- Westville	Arrowwood, redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood.	Amur maple, eastern redcedar, flowering dogwood.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
24B, 24C2--- Dodge	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
27B, 27C2, 27D2, 27E2--- Miami	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
29D2--- Dubuque	Redosier dogwood, gray dogwood, arrowwood.	Silky dogwood, autumn-olive.	Eastern redcedar, Amur maple, flowering dogwood.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
36A, 36B, 36C2--- Tama	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
41--- Muscatine	Redosier dogwood, gray dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
55B--- Sidell	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood.
60C2--- La Rose	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
61--- Atterberry	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
68--- Sable	Redosier dogwood, gray dogwood.	Silky dogwood, oriental arborvitae, Amur maple.	Baldcypress, Russian-olive.	Norway spruce, green ash.	American sycamore, eastern cottonwood, pin oak.
73--- Ross	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	American sycamore, eastern cottonwood.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
74---------- Radford	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
77---------- Huntsville	Gray dogwood, redosier dogwood.	Amur honeysuckle, silky dogwood, autumn-olive.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
82---------- Millington	Arrowwood, gray dogwood, redosier dogwood.	Silky dogwood, forsythia.	Baldcypress, Amur maple.	Green ash, pin oak.	Eastern cottonwood, American sycamore, red maple.
87B, 87C---------- Dickinson	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood.	Flowering dogwood, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	---
88B---------- Sparta	American hazel, European privet.	Tamarisk, late lilac, forsythia, autumn-olive.	Austrian pine, tall purple willow.	Eastern white pine, red pine, jack pine.	---
102---------- La Hogue	Gray dogwood, redosier dogwood.	Silky dogwood, autumn-olive, Amur honeysuckle.	Russian-olive, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
103---------- Houghton	Gray dogwood, dwarf purple willow.	Amur honeysuckle, redosier dogwood, silky dogwood.	Northern white-cedar, tall purple willow, medium purple willow.	Pin oak, green ash.	Lombardy poplar.
105B---------- Batavia	Arrowwood, redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive.	Amur maple, eastern redcedar, flowering dogwood.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
107---------- Sawmill	Gray dogwood, arrowwood, redosier dogwood.	Silky dogwood, forsythia.	Amur maple, baldcypress.	Green ash, pin oak	Red maple, eastern cottonwood, American sycamore.
119C2---------- Elco	Arrowwood, redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive.	Amur maple, eastern redcedar, flowering dogwood.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
123*. Riverwash					
125---------- Selma	Gray dogwood, redosier dogwood.	Amur maple, silky dogwood, oriental arborvitae.	Baldcypress, Russian-olive.	Norway spruce, green ash.	American sycamore, pin oak, eastern cottonwood.
145B, 145C2------- Saybrook	Gray dogwood, redosier dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
152---------- Drummer	Redosier dogwood, gray dogwood.	Silky dogwood, Amur maple, oriental arborvitae.	Baldcypress, Russian-olive.	Norway spruce, green ash.	American sycamore, pin oak, eastern cottonwood.
154A---------- Flanagan	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
171A, 171B, 171C2- Catlin	Gray dogwood, redosier dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
175B, 175C-------- Lamont	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
198---------- Elburn	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, eastern redcedar.	Eastern white pine, Douglas-fir, Norway spruce.	Eastern cottonwood, American sycamore.
199A, 199B, 199C2- Plano	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
219---------- Millbrook	Arrowwood, redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood.	Amur maple, eastern redcedar, flowering dogwood.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
221B, 221C2------- Parr	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	American sycamore, eastern cottonwood.
223B, 223C2------- Varna	Redosier dogwood, gray dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
233B, 233C2------- Birkbeck	Gray dogwood, redosier dogwood.	Silky dogwood, autumn-olive, Amur honeysuckle.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
242A---------- Kendall	Gray dogwood, redosier dogwood.	Silky dogwood, Amur honeysuckle.	Amur maple, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Red maple, American sycamore, eastern cottonwood.
243A, 243B, 243C2- St. Charles	Gray dogwood, redosier dogwood.	Amur honeysuckle, silky dogwood, autumn-olive.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
259B, 259C2---- Assumption	Gray dogwood, redosier dogwood.	Amur honeysuckle, silky dogwood, autumn-olive.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
278A---------- Stronghurst	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Amur maple, eastern redcedar, flowering dogwood.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
279A---------- Rozetta	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Russian-olive, flowering dogwood, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood.
280B, 280C2, 280D2---------- Fayette	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
290B---------- Warsaw	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
294B, 294C2------- Symerton	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
321---------- Du Page	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood.	Russian-olive, Amur maple, baldcypress.	Eastern white pine, Norway spruce.	Eastern cottonwood, American sycamore, red maple.
324B, 324C2------- Ripon	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
327B---------- Fox	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
347---------- Canisteo	Redosier dogwood, gray dogwood, arrowwood.	Silky dogwood, forsythia.	Amur maple, baldcypress.	Green ash, pin oak.	Eastern cottonwood, American sycamore, red maple.
361B, 361C2, 361D2---------- Kidder	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
363B, 363C2------- Griswold	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
386A, 386B-------- Downs	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood.
387A, 387B-------- Ockley	Redosier dogwood, gray dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
397B, 397D, 397F-- Boone	Vanhoutte spirea, gray dogwood, indiancurrant coralberry.	Autumn-olive, eastern redcedar, roughleaf dogwood.	Norway spruce, eastern white pine.	---	---
398A, 398B-------- Wea	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	American sycamore, eastern cottonwood.
410B, 410C2------- Woodbine	Gray dogwood, arrowwood, redosier dogwood.	Autumn-olive, silky dogwood.	Amur maple, eastern redcedar, flowering dogwood.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
411B, 411C2------- Ashdale	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
412B, 412C2------- Ogle	Gray dogwood, redosier dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
414B-------------- Myrtle	Arrowwood, redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive.	Eastern redcedar, Amur maple, flowering dogwood.	Douglas-fir, Norway spruce, eastern white pine.	Eastern cottonwood.
415--------------- Orion	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood.
416B, 416C2------- Durand	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Douglas-fir, eastern white pine, Norway spruce.	Eastern cottonwood, American sycamore.
419B, 419C2------- Flagg	Arrowwood, redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive.	Eastern redcedar, Amur maple, flowering dogwood.	Douglas-fir, Norway spruce, eastern white pine.	Eastern cottonwood.
429B, 429C2------- Palsgrove	Gray dogwood, arrowwood, redosier dogwood.	Silky dogwood, autumn-olive.	Eastern redcedar, Amur maple, flowering dogwood.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
440A, 440B, 440C2-- Jasper	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
451---------- Lawson	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
490---------- Odell	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	American sycamore, eastern cottonwood.
503B, 503C2------- Rockton	Redosier dogwood, gray dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	American sycamore, eastern cottonwood.
504D, 504F-------- Sogn	Redosier dogwood, gray dogwood, Vanhoutte spirea.	Silky dogwood, autumn-olive.	Eastern redcedar--	---	---
505C2, 505E2------ Dunbarton	Redosier dogwood, gray dogwood, Vanhoutte spirea.	Silky dogwood, autumn-olive.	Eastern redcedar--	---	---
509B, 509C2, 509D2, 509E2----- Whalan	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Eastern redcedar, flowering dogwood, Amur maple.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
570A, 570B, 570C2, 570D2---------- Martinsville	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
661B, 661C2------- Atkinson	Redosier dogwood, gray dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	American sycamore, eastern cottonwood.
727B---------- Waukee	Redosier dogwood, gray dogwood.	Tatarian honeysuckle, bloodtwig dogwood, Siberian dogwood.	Amur maple, eastern redcedar.	Red pine, Norway spruce, common hackberry.	Silver maple, eastern cottonwood.
728C2---------- Winnebago	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
742B, 742C-------- Dickinson	Redosier dogwood, gray dogwood.	Tatarian honeysuckle, Siberian dogwood, bloodtwig dogwood.	Eastern redcedar, Amur maple.	Red pine, Norway spruce, common hackberry.	Silver maple, eastern cottonwood.

See footnote at end of table.

TABLE 7.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average heights, in feet, of--				
	<8	8-15	16-25	26-35	>35
761B, 761D, 761F--Eleva	Vanhoutte spirea, gray dogwood, indiancurrant coralberry.	Autumn-olive, eastern redcedar, roughleaf dogwood.	Norway spruce, Siberian peashrub.	---	---
776--Comfrey	Redosier dogwood, gray dogwood.	Oriental arborvitae, silky dogwood, Amur maple.	Russian-olive, baldcypress.	Norway spruce, green ash.	American sycamore, eastern cottonwood, pin oak.
779B, 779D--Chelsea	Vanhoutte spirea, gray dogwood, indiancurrant coralberry.	Eastern redcedar, autumn-olive, roughleaf dogwood.	Bur oak, ponderosa pine, jack pine, green ash, common hackberry.	---	---
802*. Orthents					
864*, 865*. Pits					
919C*, 919E*: Rodman	Vanhoutte spirea, gray dogwood, indiancurrant coralberry.	Autumn-olive, eastern redcedar, roughleaf dogwood.	Norway spruce, eastern white pine.	---	---
Fox	Gray dogwood, redosier dogwood, arrowwood.	Autumn-olive, silky dogwood.	Flowering dogwood, Amur maple, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood.
939C*, 939E*: Rodman	Vanhoutte spirea, gray dogwood, indiancurrant coralberry.	Autumn-olive, eastern redcedar, roughleaf dogwood.	Norway spruce, eastern white pine.	---	---
Warsaw	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
4776--Comfrey	Redosier dogwood, gray dogwood.	Silky dogwood, baldcypress.	Green ash	Black spruce	---
6506B, 6506C--Hitt Variant	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Eastern redcedar, Russian-olive.	Douglas-fir, eastern white pine, Norway spruce.	Eastern cottonwood, American sycamore.

* 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
21B Pecatonica	Slight	Slight	Moderate: slope.	Slight	Slight.
21C2 Pecatonica	Slight	Slight	Severe: slope.	Slight	Slight.
21D2 Pecatonica	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
22C2 Westville	Slight	Slight	Severe: slope.	Slight	Slight.
22D2 Westville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
24B Dodge	Slight	Slight	Moderate: slope.	Slight	Slight.
24C2 Dodge	Slight	Slight	Severe: slope.	Slight	Slight.
27B Miami	Slight	Slight	Moderate: slope.	Slight	Slight.
27C2 Miami	Slight	Slight	Severe: slope.	Slight	Slight.
27D2 Miami	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
27E2 Miami	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
29D2 Dubuque	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: thin layer, slope.
36A Tama	Slight	Slight	Slight	Slight	Slight.
36B Tama	Slight	Slight	Moderate: slope.	Slight	Slight.
36C2 Tama	Slight	Slight	Severe: slope.	Slight	Slight.
41 Muscatine	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
55B Sidell	Slight	Slight	Moderate: slope.	Slight	Slight.
60C2 La Rose	Slight	Slight	Severe: slope.	Slight	Slight.
61 Atterberry	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
68 Sable	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
73 Ross	Severe: floods.	Slight	Moderate: floods.	Slight	Moderate: 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.
82--- Millington	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: floods, wetness.
87B--- Dickinson	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
87C--- Dickinson	Slight---	Slight---	Severe: slope.	Slight---	Slight.
88B--- Sparta	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: too sandy.
102--- La Hogue	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
103--- Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, floods.
105B--- Batavia	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
107--- Sawmill	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
119C2--- Elco	Moderate: percs slowly.	Slight---	Severe: slope.	Slight---	Slight.
123*. Riverwash					
125--- Selma	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
145B--- Saybrook	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
145C2--- Saybrook	Slight---	Slight---	Severe: slope.	Slight---	Slight.
152--- Drummer	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
154A--- Flanagan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
171A, 171B--- Catlin	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
171C2--- Catlin	Slight---	Slight---	Severe: slope.	Slight---	Slight.
175B--- Lamont	Slight---	Slight---	Moderate: slope.	Slight---	Slight.

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
175C---------- Lamont	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
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.
199C2---------- Plano	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
219---------- Millbrook	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
221B---------- Parr	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
221C2---------- Parr	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
223B---------- Varna	Moderate: percs slowly.	Slight----------	Moderate: percs slowly, slope.	Slight----------	Slight.
223C2---------- Varna	Moderate: percs slowly.	Slight----------	Severe: slope.	Slight----------	Slight.
233B---------- Birkbeck	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
233C2---------- Birkbeck	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
242A---------- Kendall	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
243A---------- St. Charles	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
243B---------- St. Charles	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
243C2---------- St. Charles	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
259B---------- Assumption	Moderate: percs slowly.	Slight----------	Moderate: slope, percs slowly.	Slight----------	Slight.
259C2---------- Assumption	Moderate: percs slowly.	Slight----------	Severe: slope.	Slight----------	Slight.
278A---------- Stronghurst	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
279A---------- Rozetta	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
280B---------- Fayette	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
280C2---------- Fayette	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.

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
280D2--Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
290B--Warsaw	Slight	Slight	Moderate: slope.	Slight	Slight.
294B--Symerton	Slight	Slight	Moderate: slope.	Slight	Slight.
294C2--Symerton	Slight	Slight	Severe: slope.	Slight	Slight.
321--Du Page	Severe: floods.	Slight	Slight	Slight	Slight.
324B--Ripon	Slight	Slight	Moderate: depth to rock, slope.	Slight	Moderate: thin layer.
324C2--Ripon	Slight	Slight	Severe: slope.	Slight	Moderate: thin layer.
327B--Fox	Slight	Slight	Moderate: slope.	Slight	Slight.
347--Canisteo	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
361B--Kidder	Slight	Slight	Moderate: slope.	Slight	Slight.
361C2--Kidder	Slight	Slight	Severe: slope.	Slight	Slight.
361D2--Kidder	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
363B--Griswold	Slight	Slight	Moderate: slope.	Slight	Slight.
363C2--Griswold	Slight	Slight	Severe: slope.	Slight	Slight.
386A--Downs	Slight	Slight	Slight	Slight	Slight.
386B--Downs	Slight	Slight	Moderate: slope.	Slight	Slight.
387A--Ockley	Slight	Slight	Slight	Slight	Slight.
387B--Ockley	Slight	Slight	Moderate: slope.	Slight	Slight.
397B--Boone	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
397D--Boone	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: too sandy.
397F--Boone	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.	Severe: too sandy, slope.

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
398A---- Wea	Slight	Slight	Slight	Slight	Slight.
398B---- Wea	Slight	Slight	Moderate: slope.	Slight	Slight.
410B---- Woodbine	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight	Slight.
410C2---- Woodbine	Moderate: percs slowly.	Slight	Severe: slope.	Slight	Slight.
411B---- Ashdale	Slight	Slight	Moderate: slope, percs slowly.	Slight	Slight.
411C2---- Ashdale	Slight	Slight	Severe: slope.	Slight	Slight.
412B---- Ogle	Slight	Slight	Moderate: slope.	Slight	Slight.
412C2---- Ogle	Slight	Slight	Severe: slope.	Slight	Slight.
414B---- Myrtle	Slight	Slight	Moderate: slope.	Slight	Slight.
415---- Orion	Severe: floods, wetness.	Moderate: wetness, floods.	Severe: wetness, floods.	Moderate: wetness, floods.	Severe: floods.
416B---- Durand	Slight	Slight	Moderate: slope.	Slight	Slight.
416C2---- Durand	Slight	Slight	Severe: slope.	Slight	Slight.
419B---- Flagg	Slight	Slight	Moderate: slope.	Slight	Slight.
419C2---- Flagg	Slight	Slight	Severe: slope.	Slight	Slight.
429B---- Palsgrove	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight	Slight.
429C2---- Palsgrove	Severe: percs slowly.	Moderate: slope.	Severe: slope, percs slowly.	Slight	Moderate: slope.
440A---- Jasper	Slight	Slight	Slight	Slight	Slight.
440B---- Jasper	Slight	Slight	Moderate: slope.	Slight	Slight.
440C2---- Jasper	Slight	Slight	Severe: slope.	Slight	Slight.
451---- Lawson	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
490---- Odell	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

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
503B---------- Rockton	Slight----------	Slight----------	Moderate: depth to rock, slope.	Slight----------	Moderate: thin layer.
503C2---------- Rockton	Slight----------	Slight----------	Severe: slope.	Slight----------	Moderate: thin layer.
504D---------- Sogn	Severe: depth to rock.	Moderate: slope.	Severe: depth to rock, slope.	Slight----------	Severe: thin layer.
504F---------- Sogn	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock, slope.	Moderate: slope.	Severe: thin layer, slope.
505C2---------- Dunbarton	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope, depth to rock.	Moderate: too clayey.	Severe: thin layer.
505E2---------- Dunbarton	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: too clayey, slope.	Severe: slope, thin layer.
509B---------- Whalan	Moderate: percs slowly.	Slight----------	Moderate: depth to rock, slope, percs slowly.	Slight----------	Moderate: thin layer.
509C2---------- Whalan	Moderate: percs slowly.	Slight----------	Severe: slope.	Slight----------	Moderate: thin layer.
509D2---------- Whalan	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
509E2---------- Whalan	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
570A---------- Martinsville	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
570B---------- Martinsville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
570C2---------- Martinsville	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
570D2---------- Martinsville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
661B---------- Atkinson	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
661C2---------- Atkinson	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
727B---------- Waukee	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
728C2---------- Winnebago	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.

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
742B---------- Dickinson	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
742C---------- Dickinson	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
761B---------- Eleva	Slight----------	Slight----------	Moderate: depth to rock, slope.	Slight----------	Moderate: thin layer.
761D---------- Eleva	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
761F---------- Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
776---------- Comfrey	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
779B---------- Chelsea	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: too sandy.
779D---------- Chelsea	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
802*. Orthents					
864*, 865*. Pits					
919C*: Rodman----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope, small stones.
Fox----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
919E*: Rodman----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope, small stones.
Fox----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
939C*, 939E*: Rodman----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope, small stones.
Warsaw----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
4776---------- Comfrey	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
6506B---------- Hitt Variant	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
6506C---------- Hitt Variant	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.

* 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 herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
21B, 21C2---------- Pecatonica	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
21D2---------- Pecatonica	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
22C2---------- Westville	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
22D2---------- Westville	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
24B---------- Dodge	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
24C2---------- Dodge	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
27B---------- Miami	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
27C2---------- Miami	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
27D2, 27E2--------- Miami	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
29D2---------- Dubuque	Fair	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---------- Tama	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
41---------- Muscatine	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
55B---------- Sidell	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
60C2---------- La Rose	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
61---------- Atterberry	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
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.
82---------- Millington	Good	Good	Good	Good	Good	Good	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 herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
87B---- Dickinson	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
87C---- Dickinson	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
88B---- Sparta	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
102---- La Hogue	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
103---- Houghton	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
105B---- Batavia	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
107---- Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Poor.
119C2---- Elco	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
123*. Riverwash									
125---- Selma	Good	Good	Good	Good	Good	Good	Good	Good	Good.
145B---- Saybrook	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
145C2---- Saybrook	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
152---- Drummer	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
154A---- Flanagan	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
171A, 171B, 171C2-- Catlin	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
175B---- Lamont	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
175C---- Lamont	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
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.
199C2---- Plano	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
219---- Millbrook	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
221B---- Parr	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.

See footnote at end of table.

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 herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
221C2--Parr	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
223B--Varna	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
223C2--Varna	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
233B, 233C2--Birkbeck	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
242A--Kendall	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
243A, 243B--St. Charles	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
243C2--St. Charles	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
259B--Assumption	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
259C2--Assumption	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
278A--Stronghurst	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
279A--Rozetta	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
280B--Fayette	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
280C2, 280D2--Fayette	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
290B--Warsaw	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
294B--Symerton	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
294C2--Symerton	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
321--Du Page	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
324B--Ripon	Good	Good	Good	Fair	Very poor	Very poor	Good	Fair	Very poor.
324C2--Ripon	Fair	Good	Good	Fair	Very poor	Very poor	Good	Fair	Very poor.
327B--Fox	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
347--Canisteo	Fair	Fair	Fair	Fair	Good	Good	Fair	Poor	Good.
361B, 361C2--Kidder	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.

See footnote at end of table.

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 herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
361D2---------- Kidder	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
363B---------- Griswold	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
363C2---------- Griswold	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
386A, 386B--------- Downs	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
387A, 387B--------- Ockley	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
397B, 397D--------- Boone	Poor	Poor	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
397F---------- Boone	Very poor	Poor	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
398A, 398B--------- Wea	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
410B, 410C2-------- Woodbine	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
411B---------- Ashdale	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
411C2---------- Ashdale	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
412B---------- Ogle	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
412C2---------- Ogle	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
414B---------- Myrtle	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
415---------- Orion	Fair	Fair	Good	Good	Good	Fair	Good	Good	Good.
416B, 416C2-------- Durand	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
419B---------- Flagg	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
419C2---------- Flagg	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
429B---------- Palsgrove	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
429C2---------- Palsgrove	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
440A, 440B--------- Jasper	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
440C2---------- Jasper	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.

See footnote at end of table.

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 herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
451---------- Lawson	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
490---------- Odell	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
503B, 503C2-------- Rockton	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
504D, 504F--------- Sogn	Very poor	Very poor	Poor	---	Very poor	Very poor	Very poor	---	Very poor.
505C2---------- Dunbarton	Fair	Good	Good	Fair	Very poor	Very poor	Good	Fair	Very poor.
505E2---------- Dunbarton	Poor	Fair	Good	Fair	Very poor	Very poor	Fair	Fair	Very poor.
509B, 509C2, 509D2- Whalan	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
509E2---------- Whalan	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
570A, 570B--------- Martinsville	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
570C2---------- Martinsville	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
570D2---------- Martinsville	Poor	Fair	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
661B---------- Atkinson	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
661C2---------- Atkinson	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
727B---------- Waukee	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
728C2---------- Winnebago	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
742B---------- Dickinson	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Very poor.
742C---------- Dickinson	Fair	Fair	Fair	Fair	Very poor	Poor	Fair	Fair	Very poor.
761B, 761D--------- Eleva	Good	Good	Good	Good	Very poor	Very poor	Fair	Fair	Very poor.
761F---------- Eleva	Poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
776---------- Comfrey	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

See footnote at end of table.

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 herbaceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
779B---------- Chelsea	Poor	Fair	Fair	Poor	Very poor	Very poor	Fair	Poor	Very poor.
779D---------- Chelsea	Very poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
802*. Orthents									
864*, 865*. Pits									
919C*: Rodman----------	Very poor	Poor	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Fox----------	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
919E*: Rodman----------	Very poor	Poor	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Fox----------	Fair	Good	Good	Good	Very poor	Very poor	Fair	Good	Very poor.
939C*, 939E*: Rodman----------	Very poor	Poor	Fair	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Warsaw----------	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
4776---------- Comfrey	Poor	Poor	Fair	Very poor	Good	Good	Poor	Poor	Good.
6506B---------- Hitt Variant	Good	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
6506C---------- Hitt Variant	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
21B---------- Pecatonica	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
21C2---------- Pecatonica	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
21D2---------- Pecatonica	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
22C2---------- Westville	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
22D2---------- Westville	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
24B, 24C2--------- Dodge	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
27B---------- Miami	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell,	Moderate: low strength, frost action.	Slight.
27C2---------- Miami	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, frost action.	Slight.
27D2---------- Miami	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: slope.
27E2---------- Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
29D2---------- Dubuque	Severe: depth to rock.	Moderate: shrink-swell, slope.	Severe: depth to rock.	Severe: slope.	Severe: low strength, frost action.	Moderate: thin layer, slope.
36A, 36B---------- Tama	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
36C2---------- Tama	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
41---------- Muscatine	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
55B---------- Sidell	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength, frost action.	Slight.
60C2---------- La Rose	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
61---------- Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: 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.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
73---------- Ross	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength, floods.	Moderate: floods.
74---------- Radford	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, frost action, floods.	Moderate: wetness, floods.
77---------- Huntsville	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods, frost action, low strength.	Moderate: floods.
82---------- Millington	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness.
87B---------- Dickinson	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
87C---------- Dickinson	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
88B---------- Sparta	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: too sandy.
102---------- La Hogue	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
103---------- Houghton	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, low strength, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: excess humus, wetness, floods.
105B---------- Batavia	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
107---------- Sawmill	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods.
119C2---------- Elco	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
123*. Riverwash						
125---------- Selma	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action, floods.	Severe: wetness.
145B---------- Saybrook	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.

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
145C2--Saybrook	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: frost action, low strength.	Slight.
152--Drummer	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
154A--Flanagan	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: frost action, shrink-swell,	Moderate: wetness.
171A, 171B--Catlin	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
171C2--Catlin	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: frost action, low strength.	Slight.
175B--Lamont	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
175C--Lamont	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
198--Elburn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
199A, 199B--Plano	Slight	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
199C2--Plano	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
219--Millbrook	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness, low strength.	Moderate: wetness.
221B--Parr	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
221C2--Parr	Moderate: slope.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
223B--Varna	Slight	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
223C2--Varna	Slight	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
233B--Birkbeck	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
233C2--Birkbeck	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.

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
242A---------- Kendall	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
243A---------- St. Charles	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
243B---------- St. Charles	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
243C2--------- St. Charles	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: slope.	Severe: frost action, low strength.	Slight.
259B---------- Assumption	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
259C2--------- Assumption	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
278A---------- Stronghurst	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
279A---------- Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
280B---------- Fayette	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
280C2--------- Fayette	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
280D2--------- Fayette	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
290B---------- Warsaw	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
294B---------- Symerton	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
294C2--------- Symerton	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
321---------- Du Page	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength.	Slight.
324B---------- Ripon	Severe: depth to rock.	Moderate: depth to rock, shrink-swell.	Severe: depth to rock.	Moderate: depth to rock, shrink-swell.	Severe: frost action, low strength.	Moderate: thin layer.
324C2--------- Ripon	Severe: depth to rock.	Moderate: depth to rock, shrink-swell, slope.	Severe: depth to rock.	Moderate: slope, depth to rock, shrink-swell.	Severe: frost action, low strength.	Moderate: thin layer.

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
327B---------- Fox	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
347----------	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: low strenght, wetness, floods.	Severe: wetness, floods.
361B, 361C2------- Kidder	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
361D2---------- Kidder	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength, frost action.	Moderate: slope.
363B---------- Griswold	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
363C2---------- Griswold	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
386A, 386B-------- Downs	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
387A---------- Ockley	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
387B---------- Ockley	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
397B---------- Boone	Severe: cutbanks cave.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Slight---------	Severe: too sandy.
397D---------- Boone	Severe: cutbanks cave.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.	Severe: too sandy.
397F---------- Boone	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: too sandy, slope.
398A, 398B-------- Wea	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
410B---------- Woodbine	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.	Slight.
410C2---------- Woodbine	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
411B---------- Ashdale	Moderate: depth to rock.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
411C2---------- Ashdale	Moderate: depth to rock.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
412B---------- Ogle	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.

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
412C2--Ogle	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
414B--Myrtle	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
415--Orion	Severe: wetness, floods.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, frost action, low strength.	Severe: floods.
416B--Durand	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
416C2--Durand	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
419B--Flagg	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
419C2--Flagg	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: frost action, low strength.	Slight.
429B--Palsgrove	Moderate: depth to rock.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
429C2--Palsgrove	Moderate: depth to rock.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: slope.	Severe: frost action, low strength.	Moderate: slope.
440A, 440B--Jasper	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: low strength.	Slight.
440C2--Jasper	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
451--Lawson	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: frost action, low strength, floods.	Moderate: wetness, floods.
490--Odell	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength, wetness.	Moderate: wetness.
503B, 503C2--Rockton	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Moderate: thin layer.
504D--Sogn	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: thin layer.
504F--Sogn	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: thin layer, slope.

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
505C2--Dunbarton	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: slope, shrink-swell.	Moderate: slope, depth to rock, frost action.	Severe: thin layer.
505E2--Dunbarton	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: depth to rock, slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope.	Severe: slope, thin layer.
509B--Whalan	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Slight	Moderate: low strength, frost action.	Moderate: thin layer.
509C2--Whalan	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength, frost action.	Moderate: thin layer.
509D2--Whalan	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, low strength, frost action.	Moderate: slope, thin layer.
509E2--Whalan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
570A, 570B--Martinsville	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
570C2--Martinsville	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope.	Severe: low strength.	Slight.
570D2--Martinsville	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
661B--Atkinson	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Slight	Severe: low strength.	Slight.
661C2--Atkinson	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Severe: low strength.	Slight.
727B--Waukee	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: low strength.	Slight.
728C2--Winnebago	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
742B--Dickinson	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
742C--Dickinson	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
761B--Eleva	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength, frost action.	Moderate: thin layer.
761D--Eleva	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, low strength, frost action.	Moderate: slope, thin layer.

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
761F---------- Eleva	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
776---------- Comfrey	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
779B---------- Chelsea	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: too sandy.
779D---------- Chelsea	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
802*. Orthents						
864*, 865*. Pits						
919C*: Rodman----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
Fox----------	Severe: cutbanks cave.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
919E*: Rodman----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Fox----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
939C*: Rodman----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
Warsaw----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
939E*: Rodman----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Warsaw----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
4776---------- Comfrey	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods.
6506B---------- Hitt Variant	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, low strength.	Slight.
6506C---------- Hitt Variant	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: slope, shrink-swell.	Moderate: frost action, low strength.	Slight.

* 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
21B Pecatonica	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
21C2 Pecatonica	Slight	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
21D2 Pecatonica	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
22C2 Westville	Slight	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
22D2 Westville	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
24B Dodge	Slight	Moderate: slope, seepage.	Slight	Slight	Fair: small stones.
24C2 Dodge	Slight	Severe: slope.	Slight	Slight	Fair: small stones.
27B Miami	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
27C2 Miami	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
27D2 Miami	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
27E2 Miami	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
29D2 Dubuque	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: area reclaim.
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.
41 Muscatine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
55B Sidell	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
60C2 La Rose	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
61 Atterberry	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

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
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.
74---------- Radford	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
77---------- Huntsville	Severe: floods.	Moderate: seepage.	Severe: floods.	Severe: floods.	Good.
82---------- Millington	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
87B---------- Dickinson	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
87C---------- Dickinson	Slight----------	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
88B---------- Sparta	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
102---------- La Hogue	Severe: wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Severe: wetness, seepage.	Poor: wetness.
103---------- Houghton	Severe: wetness, floods, percs slowly.	Severe: wetness, seepage, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: hard to pack, wetness.
105B---------- Batavia	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
107---------- Sawmill	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
119C2---------- Elco	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
123*. Riverwash					
125---------- Selma	Severe: wetness, floods.	Severe: seepage, wetness.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness.
145B---------- Saybrook	Moderate: percs slowly, wetness.	Moderate: slope, seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.

See footnote at end of table.

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
145C2--Saybrook	Moderate: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
152--Drummer	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
154A--Flanagan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
171A, 171B--Catlin	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
171C2--Catlin	Severe: wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
175B--Lamont	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
175C--Lamont	Slight	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Good.
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: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
199C2--Plano	Slight	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
219--Millbrook	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
221B--Parr	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
221C2--Parr	Moderate: percs slowly.	Severe: slope.	Slight	Slight	Good.
223B--Varna	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
223C2--Varna	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness, too clayey.	Slight	Fair: too clayey.
233B--Birkbeck	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
233C2--Birkbeck	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
242A--Kendall	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

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
243A, 243B---------- St. Charles	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
243C2---------- St. Charles	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
259B---------- Assumption	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: too clayey, wetness.	Slight----------	Fair: too clayey, wetness.
259C2---------- Assumption	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: too clayey, wetness.	Slight----------	Fair: too clayey, wetness.
278A---------- Stronghurst	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
279A---------- Rozetta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
280B---------- Fayette	Slight----------	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
280C2---------- Fayette	Slight----------	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
280D2---------- Fayette	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
290B---------- Warsaw	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones.
294B---------- Symerton	Severe: percs slowly.	Moderate: slope.	Slight----------	Slight----------	Fair: too clayey.
294C2---------- Symerton	Severe: percs slowly.	Severe: slope.	Slight----------	Slight----------	Fair: too clayey.
321---------- Du Page	Moderate: floods.	Moderate: seepage.	Moderate: floods.	Moderate: floods.	Good.
324B---------- Ripon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
324C2---------- Ripon	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
327B---------- Fox	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.
347---------- Canisteo	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
361B---------- Kidder	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
361C2---------- Kidder	Slight----------	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones.

See footnote at end of table.

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
361D2--- Kidder	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones.
363B--- Griswold	Slight	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
363C2--- Griswold	Slight	Severe: slope.	Slight	Slight	Fair: small stones.
386A--- Downs	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
386B--- Downs	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
387A, 387B--- Ockley	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
397B--- Boone	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: too sandy, seepage.
397D--- Boone	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: too sandy, seepage.
397F--- Boone	Severe: slope, depth to rock.	Severe: seepage, depth to rock, slope.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope.	Poor: slope, too sandy, seepage.
398A, 398B--- Wea	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
410B--- Woodbine	Severe: depth to rock, percs slowly.	Moderate: depth to rock, slope, seepage.	Severe: depth to rock.	Slight	Fair: too clayey.
410C2--- Woodbine	Severe: depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Slight	Fair: too clayey.
411B--- Ashdale	Severe: percs slowly, depth to rock.	Moderate: slope, depth to rock, seepage.	Severe: depth to rock.	Slight	Fair: area reclaim, too clayey.
411C2--- Ashdale	Severe: percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock.	Slight	Fair: area reclaim, too clayey.
412B--- Ogle	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
412C2--- Ogle	Slight	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
414B--- Myrtle	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

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
415---------- Orion	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
416B---------- Durand	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
416C2---------- Durand	Slight----------	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
419B---------- Flagg	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight----------	Fair: too clayey.
419C2---------- Flagg	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
429B---------- Palsgrove	Severe: depth to rock, percs slowly.	Moderate: depth to rock, seepage, slope.	Severe: depth to rock.	Slight----------	Poor: area reclaim.
429C2---------- Palsgrove	Severe: depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Poor: area reclaim.
440A---------- Jasper	Moderate: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
440B---------- Jasper	Moderate: percs slowly.	Moderate: slope, seepage.	Slight----------	Slight----------	Good.
440C2---------- Jasper	Moderate: percs slowly.	Severe: slope.	Slight----------	Slight----------	Good.
451---------- Lawson	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
490---------- Odell	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
503B---------- Rockton	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
503C2---------- Rockton	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
504D---------- Sogn	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
504F---------- Sogn	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
505C2---------- Dunbarton	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, area reclaim.

See footnote at end of table.

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
505E2---------- Dunbarton	Severe: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope, depth to rock.	Poor: slope, thin layer, area reclaim.
509B---------- Whalan	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
509C2---------- Whalan	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
509D2---------- Whalan	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Poor: area reclaim.
509E2---------- Whalan	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: area reclaim, slope.
570A---------- Martinsville	Slight----------	Moderate: seepage.	Slight----------	Slight----------	Fair: too clayey.
570B---------- Martinsville	Slight----------	Moderate: seepage, slope.	Slight----------	Slight----------	Fair: too clayey.
570C2---------- Martinsville	Slight----------	Severe: slope.	Slight----------	Slight----------	Fair: too clayey.
570D2---------- Martinsville	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
661B---------- Atkinson	Severe: depth to rock, percs slowly.	Moderate: slope, depth to rock, seepage.	Severe: depth to rock.	Slight----------	Fair: area reclaim.
661C2---------- Atkinson	Severe: depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Slight----------	Fair: area reclaim.
727B---------- Waukee	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.
728C2---------- Winnebago	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
742B---------- Dickinson	Slight----------	Severe: seepage.	Slight----------	Severe: seepage.	Good.
742C---------- Dickinson	Slight----------	Severe: slope, seepage.	Slight----------	Severe: seepage.	Good.
761B---------- Eleva	Severe: depth to rock.	Severe: seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
761D---------- Eleva	Severe: depth to rock.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim.
761F---------- Eleva	Severe: depth to rock, slope.	Severe: slope, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, area reclaim.

See footnote at end of table.

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
776---------- Comfrey	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
779B---------- Chelsea	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
779D---------- Chelsea	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
802*. Orthents					
864*, 865*. Pits					
919C*: Rodman----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, small stones.
Fox----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.
919E*: Rodman----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, small stones.
Fox----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage, slope.	Poor: too sandy, slope, seepage.
939C*: Rodman----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, small stones.
Warsaw----------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones.
939E*: Rodman----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope, small stones.
Warsaw----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage, slope.	Poor: slope, small stones.
4776---------- Comfrey	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
6506B---------- Hitt Variant	Severe: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock.	Severe: seepage.	Fair: area reclaim.
6506C---------- Hitt Variant	Severe: depth to rock, percs slowly.	Severe: slope, seepage.	Severe: depth to rock,	Severe: seepage.	Fair: area reclaim.

* 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
21B, 21C2 Pecatonica	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
21D2 Pecatonica	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
22C2 Westville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
22D2 Westville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
24B, 24C2 Dodge	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
27B, 27C Miami	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
27D2 Miami	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
27E2 Miami	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
29D2 Dubuque	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
36A, 36B, 36C2 Tama	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
41 Muscatine	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
55B Sidell	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
60C2 La Rose	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
61 Atterberry	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
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.
77 Huntsville	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
82 Millington	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
87B, 87C---------- Dickinson	Good----------	Fair: excess fines.	Unsuited: excess fines.	Good.
88B---------- Sparta	Good----------	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy.
102---------- La Hogue	Poor: wetness, low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
103---------- Houghton	Poor: wetness, low strength.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
105B---------- Batavia	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
107---------- Sawmill	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
119C2---------- Elco	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
123*. Riverwash				
125---------- Selma	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
145B, 145C2---------- Saybrook	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
152---------- Drummer	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
154A---------- Flanagan	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
171A, 171B, 171C2----- Catlin	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
175B, 175C---------- Lamont	Good----------	Fair: excess fines.	Unsuited: excess fines.	Good.
198---------- Elburn	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
199A, 199B, 199C2----- Plano	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
219---------- Millbrook	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
221B, 221C2---------- Parr	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
223B, 223C2---------- Varna	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
233B, 233C2---------- Birkbeck	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
242A---------- Kendall	Poor: low strength, wetness.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
243A, 243B---------- St. Charles	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
243C2---------- St. Charles	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
259B, 259C2---------- Assumption	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
278A---------- Stronghurst	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
279A---------- Rozetta	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: 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.
290B---------- Warsaw	Fair: low strength.	Good----------	Good----------	Good.
294B, 294C2---------- Symerton	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
321---------- Du Page	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
324B, 324C2---------- Ripon	Poor: area reclaim, thin layer, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: area reclaim, thin layer.
327B---------- Fox	Good----------	Good----------	Good----------	Fair: thin layer.
347---------- Canisteo	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
361B---------- Kidder	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
361C2---------- Kidder	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
361D2---------- Kidder	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
363B, 363C2---------- Griswold	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
386A, 386B---------- Downs	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
387A, 387B---------- Ockley	Poor: low strength.	Good----------	Good----------	Fair: thin layer.
397B, 397D---------- Boone	Poor: thin layer, area reclaim.	Poor: thin layer.	Unsuited: excess fines.	Poor: too sandy.
397F---------- Boone	Poor: slope, thin layer, area reclaim.	Poor: thin layer.	Unsuited: excess fines.	Poor: too sandy, slope.
398A, 398B---------- Wea	Poor: low strength.	Good----------	Good----------	Fair: thin layer.
410B, 410C2---------- Woodbine	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
411B, 411C2---------- Ashdale	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
412B, 412C2---------- Ogle	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
414B---------- Myrtle	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
415---------- Orion	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
416B, 416C2---------- Durand	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
419B, 419C2---------- Flagg	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
429B---------- Palsgrove	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
429C2---------- Palsgrove	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, slope.
440A, 440B, 440C2----- Jasper	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
451---------- Lawson	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
490--Odell	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
503B, 503C2--Rockton	Poor: low strength, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: area reclaim, thin layer.
504D--Sogn	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim.
504F--Sogn	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim, slope.
505C2--Dunbarton	Poor: shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim.
505E2--Dunbarton	Poor: shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, area reclaim.
509B, 509C2--Whalan	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
509D2--Whalan	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, area reclaim.
509E2--Whalan	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
570A, 570B, 570C2--Martinsville	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
570D2--Martinsville	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
661B, 661C2--Atkinson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
727B--Waukee	Good	Good	Unsuited: excess fines.	Good.
728C2--Winnebago	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
742B, 742C--Dickinson	Fair: thin layer.	Poor: thin layer.	Unsuited: excess fines.	Good.
761B--Eleva	Poor: area reclaim, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Fair: area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
761D---------- Eleva	Poor: area reclaim, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Fair: slope, area reclaim.
761F---------- Eleva	Poor: area reclaim, slope, thin layer.	Poor: thin layer.	Unsuited: excess fines.	Poor: slope.
776---------- Comfrey	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
779B, 779D---------- Chelsea	Good----------	Good----------	Unsuited: excess fines.	Poor: too sandy.
802*. Orthents				
864*, 865*. Pits				
919C*: Rodman----------	Fair: slope.	Good----------	Good----------	Poor: small stones, slope.
Fox----------	Good----------	Good----------	Good----------	Fair: thin layer, slope.
919E*: Rodman----------	Fair: slope.	Good----------	Good----------	Poor: small stones, slope.
Fox----------	Fair: slope.	Good----------	Good----------	Poor: slope.
939C*, 939E*: Rodman----------	Fair: slope.	Good----------	Good----------	Poor: small stones, slope.
Warsaw----------	Fair: low strength.	Good----------	Good----------	Fair: slope.
4776---------- Comfrey	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
6506B, 6506C---------- Hitt Variant	Fair: low strength, thin layer, area reclaim.	Poor: excess fines, thin layer.	Unsuited: excess fines.	Fair: 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
21B---------- Pecatonica	Seepage--------	Favorable------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
21C2---------- Pecatonica	Slope, seepage.	Favorable------	Not needed-----	Erodes easily, slope.	Favorable------	Erodes easily.
21D2---------- Pecatonica	Slope, seepage.	Favorable------	Not needed-----	Erodes easily, slope.	Slope----------	Slope, erodes easily.
22C2---------- Westville	Slope, seepage.	Favorable------	Not needed-----	Erodes easily, slope.	Favorable------	Erodes easily.
22D2---------- Westville	Slope, seepage.	Favorable------	Not needed-----	Erodes easily, slope.	Slope----------	Slope, erodes easily.
24B---------- Dodge	Seepage--------	Piping---------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
24C2---------- Dodge	Seepage, slope.	Piping---------	Not needed-----	Slope, erodes easily.	Favorable------	Erodes easily.
27B---------- Miami	Favorable------	Piping---------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
27C2---------- Miami	Slope----------	Piping---------	Not needed-----	Slope, erodes easily.	Favorable------	Slope, erodes easily.
27D2, 27E2-------- Miami	Slope----------	Piping---------	Not needed-----	Slope, erodes easily.	Slope----------	Slope, erodes easily.
29D2---------- Dubuque	Seepage, depth to rock, slope.	Thin layer-----	Not needed-----	Rooting depth, erodes easily, slope.	Depth to rock	Erodes easily, depth to rock, slope.
36A, 36B---------- Tama	Seepage--------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
36C2---------- Tama	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.
41---------- Muscatine	Seepage--------	Wetness--------	Frost action---	Wetness--------	Wetness, erodes easily.	Erodes easily.
55B---------- Sidell	Seepage--------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
60C2---------- La Rose	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Favorable------	Favorable.
61---------- Atterberry	Favorable------	Hard to pack, wetness.	Frost action---	Wetness--------	Wetness, erodes easily.	Wetness, erodes easily.
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--------	Frost action, floods.	Wetness, floods.	Not needed-----	Wetness.
77---------- Huntsville	Seepage--------	Favorable------	Not needed-----	Floods---------	Favorable------	Favorable.
82---------- Millington	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
87B---------- Dickinson	Seepage----------	Seepage----------	Not needed------	Soil blowing----	Soil blowing, too sandy.	Favorable.
87C---------- Dickinson	Slope, seepage.	Seepage----------	Not needed------	Soil blowing, slope.	Soil blowing, too sandy.	Favorable.
88B---------- Sparta	Seepage----------	Piping, seepage.	Not needed------	Fast intake, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
102---------- La Hogue	Seepage----------	Wetness----------	Frost action----	Wetness----------	Wetness----------	Wetness.
103---------- Houghton	Seepage----------	Excess humus, wetness.	Frost action, excess humus, floods.	Soil blowing, wetness, floods.	Not needed------	Wetness.
105B---------- Batavia	Seepage----------	Favorable-------	Not needed------	Favorable-------	Erodes easily	Erodes easily.
107---------- Sawmill	Favorable-------	Wetness----------	Floods, frost action.	Wetness, floods.	Not needed------	Wetness.
119C2---------- Elco	Slope, seepage.	Wetness----------	Slope, frost action.	Erodes easily, wetness, slope.	Wetness----------	Erodes easily.
123*. Riverwash						
125---------- Selma	Seepage----------	Wetness----------	Floods, frost action.	Wetness, floods.	Not needed------	Wetness.
145B---------- Saybrook	Seepage----------	Favorable-------	Not needed------	Favorable-------	Erodes easily	Erodes easily.
145C2---------- Saybrook	Slope, seepage.	Favorable-------	Not needed------	Slope-----------	Erodes easily	Erodes easily.
152---------- Drummer	Seepage----------	Wetness----------	Frost action, floods.	Wetness, floods.	Not needed------	Wetness.
154A---------- Flanagan	Seepage----------	Wetness, hard to pack.	Frost action----	Wetness----------	Wetness, erodes easily.	Wetness, erodes easily.
171A, 171B--------- Catlin	Seepage----------	Hard to pack----	Not needed------	Favorable-------	Erodes easily	Erodes easily.
171C2---------- Catlin	Slope, seepage.	Hard to pack----	Not needed------	Slope-----------	Erodes easily	Erodes easily.
175B---------- Lamont	Seepage----------	Piping, seepage.	Not needed------	Soil blowing----	Too sandy, soil blowing.	Favorable.
175C---------- Lamont	Slope, seepage.	Piping, seepage.	Not needed------	Slope, soil blowing.	Too sandy, soil blowing.	Favorable.
198---------- Elburn	Seepage----------	Wetness----------	Frost action----	Wetness----------	Wetness, erodes easily.	Wetness, erodes easily.
199A, 199B--------- Plano	Seepage----------	Favorable-------	Not needed------	Favorable-------	Erodes easily	Erodes easily.
199C2---------- Plano	Slope, seepage.	Favorable-------	Not needed------	Slope-----------	Erodes easily	Slope, erodes easily.
219---------- Millbrook	Seepage----------	Wetness----------	Frost action----	Wetness----------	Wetness, erodes easily.	Wetness, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
221B---------- Parr	Favorable------	Favorable------	Not needed-----	Favorable------	Favorable------	Favorable.
221C2---------- Parr	Slope----------	Favorable------	Not needed-----	Slope----------	Favorable------	Slope.
223B---------- Varna	Favorable------	Favorable------	Not needed-----	Percs slowly---	Percs slowly---	Percs slowly.
223C2---------- Varna	Slope, seepage.	Favorable------	Not needed-----	Slope, percs slowly.	Percs slowly---	Percs slowly.
233B---------- Birkbeck	Seepage--------	Wetness--------	Frost action---	Erodes easily, wetness.	Wetness--------	Erodes easily.
233C2---------- Birkbeck	Slope, seepage.	Wetness--------	Frost action, slope.	Slope, erodes easily, wetness.	Wetness--------	Erodes easily.
242A---------- Kendall	Seepage--------	Wetness--------	Frost action---	Wetness, erodes easily.	Wetness--------	Wetness, erodes easily.
243A, 243B-------- St. Charles	Seepage--------	Favorable------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
243C2---------- St. Charles	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Favorable------	Erodes easily, slope.
259B---------- Assumption	Favorable------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
259C2---------- Assumption	Slope----------	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.
278A---------- Stronghurst	Seepage--------	Wetness--------	Frost action---	Wetness, erodes easily.	Wetness--------	Erodes easily, wetness.
279A---------- Rozetta	Seepage--------	Favorable------	Not needed-----	Erodes easily	Favorable------	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---------- Fayette	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Favorable------	Slope, erodes easily.
290B---------- Warsaw	Seepage--------	Seepage--------	Not needed-----	Favorable------	Too sandy------	Favorable.
294B---------- Symerton	Favorable------	Hard to pack---	Not needed-----	Favorable------	Erodes easily	Erodes easily.
294C2---------- Symerton	Slope----------	Hard to pack---	Not needed-----	Slope----------	Erodes easily	Erodes easily.
321---------- Du Page	Seepage--------	Favorable------	Not needed-----	Favorable------	Not needed-----	Favorable.
324B---------- Ripon	Depth to rock, seepage.	Thin layer, piping.	Not needed-----	Rooting depth	Depth to rock	Depth to rock.
324C2---------- Ripon	Slope, depth to rock, seepage.	Thin layer, piping.	Not needed-----	Slope, rooting depth.	Depth to rock	Slope, depth to rock.
327B---------- Fox	Seepage--------	Seepage--------	Not needed-----	Favorable------	Favorable------	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
347--- Canisteo	Seepage---	Wetness---	Floods, frost action.	Wetness, floods.	Not needed---	Wetness.
361B--- Kidder	Seepage---	Seepage---	Not needed---	Favorable---	Favorable---	Favorable.
361C2--- Kidder	Seepage, slope.	Seepage---	Not needed---	Slope---	Favorable---	Slope.
361D2--- Kidder	Seepage, slope.	Seepage---	Not needed---	Slope---	Slope---	Slope.
363B--- Griswold	Seepage---	Favorable---	Not needed---	Favorable---	Favorable---	Favorable.
363C2--- Griswold	Slope, seepage.	Favorable---	Not needed---	Slope---	Favorable---	Favorable.
386A, 386B--- Downs	Seepage---	Favorable---	Not needed---	Favorable---	Erodes easily	Erodes easily.
387A--- Ockley	Seepage---	Thin layer---	Not needed---	Erodes easily	Not needed---	Erodes easily.
387B--- Ockley	Seepage---	Thin layer---	Not needed---	Erodes easily	Favorable---	Erodes easily.
397B--- Boone	Depth to rock, seepage.	Seepage, thin layer.	Not needed---	Droughty, fast intake, soil blowing.	Depth to rock, too sandy.	Droughty, depth to rock.
397D--- Boone	Slope, depth to rock, seepage.	Seepage, thin layer.	Not needed---	Droughty, fast intake, soil blowing.	Depth to rock, too sandy.	Slope, droughty, depth to rock.
397F--- Boone	Slope, depth to rock, seepage.	Seepage, thin layer.	Not needed---	Droughty, fast intake, soil blowing.	Slope, depth to rock, too sandy.	Slope, droughty, depth to rock.
398A, 398B--- Wea	Seepage---	Favorable---	Not needed---	Favorable---	Erodes easily	Erodes easily.
410B--- Woodbine	Depth to rock, seepage.	Thin layer---	Not needed---	Erodes easily, percs slowly.	Percs slowly---	Erodes easily, percs slowly.
410C2--- Woodbine	Slope, depth to rock, seepage.	Thin layer---	Not needed---	Erodes easily, percs slowly, slope.	Percs slowly---	Erodes easily, percs slowly.
411B--- Ashdale	Depth to rock, seepage.	Thin layer---	Not needed---	Percs slowly---	Erodes easily, percs slowly.	Erodes easily.
411C2--- Ashdale	Slope, seepage, depth to rock.	Thin layer---	Not needed---	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily.
412B--- Ogle	Seepage---	Favorable---	Not needed---	Favorable---	Erodes easily	Erodes easily.
412C2--- Ogle	Slope---	Favorable---	Not needed---	Slope---	Erodes easily	Erodes easily.
414B--- Myrtle	Seepage---	Favorable---	Not needed---	Favorable---	Erodes easily	Erodes easily.
415--- Orion	Seepage---	Wetness---	Floods, frost action.	Floods, wetness.	Not needed---	Wetness, erodes easily.
416B--- Durand	Seepage---	Favorable---	Not needed---	Favorable---	Favorable---	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
416C2---------- Durand	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Favorable------	Favorable.
419B---------- Flagg	Seepage--------	Favorable------	Not needed-----	Erodes easily	Favorable------	Erodes easily.
419C2---------- Flagg	Slope, seepage.	Favorable------	Not needed-----	Slope, erodes easily.	Favorable------	Erodes easily.
429B---------- Palsgrove	Depth to rock, seepage.	Thin layer-----	Not needed-----	Percs slowly---	Erodes easily, percs slowly.	Erodes easily, percs slowly.
429C2---------- Palsgrove	Slope, depth to rock, seepage.	Thin layer-----	Not needed-----	Slope, percs slowly.	Erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
440A---------- Jasper	Seepage--------	Favorable------	Not needed-----	Favorable------	Not needed-----	Favorable.
440B---------- Jasper	Seepage--------	Favorable------	Not needed-----	Favorable------	Favorable------	Favorable.
440C2---------- Jasper	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Favorable------	Slope.
451---------- Lawson	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
490---------- Odell	Favorable------	Piping, wetness.	Frost action---	Wetness--------	Not needed-----	Wetness.
503B---------- Rockton	Depth to rock, seepage.	Thin layer-----	Not needed-----	Rooting depth	Depth to rock	Depth to rock.
503C2---------- Rockton	Slope, seepage, depth to rock.	Thin layer-----	Not needed-----	Slope, rooting depth.	Depth to rock	Depth to rock.
504D---------- Sogn	Slope, depth to rock.	Thin layer-----	Not needed-----	Droughty, rooting depth, slope.	Depth to rock	Slope, droughty, rooting depth.
504F---------- Sogn	Slope, depth to rock.	Thin layer-----	Not needed-----	Droughty, rooting depth, slope.	Depth to rock, slope.	Slope, droughty, rooting depth.
505C2---------- Dunbarton	Slope, depth to rock.	Thin layer-----	Not needed-----	Slope, rooting depth.	Depth to rock	Slope, rooting depth, erodes easily.
505E2---------- Dunbarton	Slope, depth to rock.	Thin layer-----	Not needed-----	Slope, rooting depth.	Depth to rock, slope.	Slope, rooting depth, erodes easily.
509B---------- Whalan	Depth to rock	Thin layer-----	Not needed-----	Rooting depth	Depth to rock	Depth to rock.
509C2---------- Whalan	Slope, depth to rock.	Thin layer-----	Not needed-----	Slope, rooting depth.	Depth to rock	Depth to rock.
509D2---------- Whalan	Slope, depth to rock.	Thin layer-----	Not needed-----	Slope, rooting depth.	Depth to rock	Slope, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
509E2--Whalan	Slope, depth to rock.	Thin layer	Not needed	Slope, rooting depth.	Depth to rock, slope.	Slope, depth to rock.
570A--Martinsville	Seepage	Favorable	Not needed	Favorable	Not needed	Erodes easily.
570B--Martinsville	Seepage	Favorable	Not needed	Favorable	Favorable	Erodes easily.
570C2--Martinsville	Slope, seepage.	Favorable	Not needed	Slope	Favorable	Slope, erodes easily.
570D2--Martinsville	Slope, seepage.	Favorable	Not needed	Slope	Slope	Slope, erodes easily.
661B--Atkinson	Depth to rock	Thin layer	Not needed	Favorable	Favorable	Favorable.
661C2--Atkinson	Slope, depth to rock.	Thin layer	Not needed	Slope	Favorable	Favorable.
727B--Waukee	Seepage	Seepage	Not needed	Favorable	Too sandy	Favorable.
728C2--Winnebago	Seepage, slope.	Favorable	Not needed	Slope	Favorable	Favorable.
742B--Dickinson	Seepage	Seepage, piping.	Not needed	Soil blowing	Too sandy, soil blowing.	Erodes easily.
742C--Dickinson	Seepage, slope.	Seepage, piping.	Not needed	Soil blowing, slope.	Too sandy, soil blowing.	Erodes easily.
761B--Eleva	Depth to rock, seepage.	Thin layer	Not needed	Soil blowing, rooting depth.	Soil blowing, depth to rock.	Depth to rock.
761D--Eleva	Slope, depth to rock, seepage.	Thin layer	Not needed	Slope, soil blowing, rooting depth.	Soil blowing, depth to rock.	Slope, depth to rock.
761F--Eleva	Slope, depth to rock, seepage.	Thin layer	Not needed	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.	Slope, depth to rock.
776--Comfrey	Seepage	Wetness	Floods, frost action.	Wetness, floods.	Not needed	Wetness.
779B--Chelsea	Seepage	Piping, seepage.	Not needed	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
779D--Chelsea	Slope, seepage.	Piping, seepage.	Not needed	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Slope, droughty.
802*. Orthents						
864*, 865*. Pits						
919C*: Rodman	Slope, seepage.	Seepage	Not needed	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Fox	Seepage, slope.	Seepage	Not needed	Slope	Favorable	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
919E*:						
Rodman	Slope, seepage.	Seepage	Not needed	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Fox	Seepage, slope.	Seepage	Not needed	Slope	Slope, too sandy.	Slope.
939C*, 939E*:						
Rodman	Slope, seepage.	Seepage	Not needed	Slope, droughty.	Slope, too sandy.	Slope, droughty.
Warsaw	Seepage	Seepage	Not needed	Slope	Too sandy	Slope.
4776 Comfrey	Seepage	Wetness	Floods, frost action.	Wetness, floods.	Not needed	Wetness.
6506B Hitt Variant	Seepage, depth to rock.	Thin layer	Not needed	Soil blowing	Soil blowing	Favorable.
6506C Hitt Variant	Seepage, depth to rock, slope.	Thin layer	Not needed	Soil blowing, slope.	Soil blowing	Favorable.

* 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		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21B, 21C2, 21D2---- Pecatonica	0-11	Silt loam-------	ML, CL	A-6, A-4	0	100	100	90-100	80-95	25-40	3-15
	11-22	Silty clay loam, loam.	ML, CL	A-6, A-4	0	100	100	90-100	70-90	25-40	3-15
	22-33	Sandy clay loam, clay loam, loam.	CL	A-6, A-7	0-5	90-100	90-100	80-90	60-90	30-45	10-20
	33-60	Sandy loam, loam	SM, SC, CL, ML	A-4, A-2, A-6	0-5	90-100	90-100	60-90	30-70	15-30	3-11
22C2, 22D2---------- Westville	0-9	Silt loam-------	CL-ML, CL	A-6, A-4	0	100	100	90-100	70-90	25-40	4-15
	9-29	Clay loam, sandy clay loam.	CL	A-6, A-7-6	0-5	90-100	90-100	80-90	60-90	30-45	11-19
	29-60	Sandy loam, loam, gravelly sandy loam.	SC, SM-SC, CL, CL-ML	A-4, A-2, A-6	0-5	90-100	90-100	60-90	30-70	15-30	3-11
24B, 24C2---------- Dodge	0-11	Silt loam-------	CL, CL-ML, ML	A-4	0	100	100	90-100	70-95	20-30	3-10
	11-29	Silty clay loam, silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	90-100	70-95	35-55	15-25
	29-33	Clay loam, sandy clay loam.	CL, SC	A-6, A-7	0-2	90-100	85-95	75-95	45-60	30-45	15-25
	33-60	Loam------------	ML, CL	A-4	1-5	85-90	85-95	75-95	50-70	15-30	*NP-10
27B, 27C2, 27D2, 27E2---------- Miami	0-8	Loam------------	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	50-90	22-34	6-15
	8-34	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7	0	92-99	89-97	78-95	64-95	35-50	17-31
	34-60	Loam, clay loam, sandy loam.	CL, CL-ML, ML	A-4, A-6	0-3	88-94	83-89	74-87	50-64	17-30	2-14
29D2---------- Dubuque	0-6	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	6-27	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	27-32	Clay------------	CH	A-7	2-10	85-95	80-90	70-85	65-85	50-70	30-45
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
36A, 36B, 36C2----- Tama	0-17	Silt loam-------	ML, OL	A-6, A-7	0	100	100	100	95-100	35-50	10-20
	17-53	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	15-25
	53-68	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
41---------- Muscatine	0-16	Silt loam-------	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	25-40	5-15
	16-50	Silty clay loam	CL	A-7	0	100	100	100	95-100	40-50	20-30
	50-60	Silt loam-------	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
55B---------- Sidell	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-35	5-15
	11-28	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	35-50	20-30
	28-58	Clay loam, loam, sandy clay loam.	CL	A-6, A-7	0	90-100	85-100	75-90	50-80	35-50	15-30
	58-60	Loam, sandy loam, sandy clay loam.	CL, CL-ML	A-4, A-6	0-2	85-95	80-90	75-85	50-65	20-30	5-15

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	
60C2---------- La Rose	0-8	Silt loam-------	ML, CL, OL	A-6, A-7	0	100	95-100	90-100	60-95	30-50	11-20
	8-20	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	85-100	60-95	30-50	11-25
	20-60	Loam, clay loam	CL	A-4, A-6	0-5	95-100	90-100	75-100	50-90	25-40	8-20
61---------- Atterberry	0-13	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	13-49	Silty clay loam	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-30
	49-60	Silt loam-------	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
68---------- Sable	0-20	Silty clay loam	CL, OH, CH, OL	A-7	0	100	100	98-100	95-100	41-65	15-35
	20-40	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	98-100	95-100	40-55	20-35
	40-60	Silt loam-------	CL	A-6	0	100	100	98-100	95-100	30-40	10-20
73---------- Ross	0-32	Loam------------	ML, CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	65-95	20-35	NP-12
	32-63	Loam, silt loam	ML, CL	A-6, A-4, A-7	0	90-100	85-100	70-100	55-95	30-45	3-18
74---------- Radford	0-28	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	95-100	80-100	30-40	5-15
	28-60	Silty clay loam, clay loam, loam.	CL	A-6	0	100	100	95-100	80-95	35-50	15-25
77---------- Huntsville	0-50	Silt loam, silty clay loam.	CL, ML	A-6, A-7	0	100	98-100	90-100	80-100	35-50	10-25
	50-60	Loam, silt loam, sandy loam.	CL, ML, SM, SC	A-4, A-6	0	90-100	80-100	55-95	45-85	18-37	3-15
82---------- Millington	0-19	Silt loam-------	ML, CL, OL	A-6, A-7, A-4	0	90-100	90-100	80-100	70-95	30-45	8-17
	19-38	Loam, silty clay loam, clay loam.	CL	A-7, A-6	0	95-100	90-100	80-100	70-95	28-50	10-22
	38-61	Stratified loam to loamy sand.	CL, CL-ML, SM-SC	A-6, A-4, A-2	0	95-100	90-100	70-100	25-95	20-40	5-20
87B, 87C---------- Dickinson	0-23	Sandy loam------	SM, SC, SM-SC	A-4, A-2	0	100	100	85-95	30-50	15-30	NP-10
	23-46	Loamy sand, loamy fine sand, fine sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	100	80-95	5-20	10-20	NP-5
	46-60	Sand, loamy fine sand, loamy sand.	SM, SP-SM	A-3, A-2	0	100	100	70-90	5-20	---	NP
88B---------- Sparta	0-17	Loamy sand------	SM, ML	A-2, A-4	0	100	100	60-95	20-55	---	NP
	17-31	Loamy fine sand, fine sand, sand.	SP-SM, SM	A-2, A-3, A-4	0	100	100	60-95	5-50	---	NP
	31-60	Sand, fine sand	SP-SM, SM	A-2, A-3	0	100	100	60-95	5-30	---	NP
102---------- La Hogue	0-18	Loam------------	CL, ML, CL-ML	A-4	0	100	95-100	80-100	50-80	20-35	3-10
	18-42	Loam, clay loam, silt loam.	CL	A-6, A-4	0	100	100	80-100	50-85	25-40	8-20
	42-62	Stratified loamy sand to silt loam.	SM, SC, CL, ML	A-2, A-4	0	80-100	80-100	51-95	5-90	<25	5-10

See footnote at end of table.

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	
103---------- Houghton	0-60	Sapric material	PT	A-8	0	---	---	---	---	---	---
105B---------- Batavia	0-11	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	23-38	5-15
	11-46	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	27-47	12-28
	46-60	Clay loam, sandy loam, silt loam.	CL, SC, SM-SC, CL-ML	A-2, A-4, A-6	0-5	90-100	80-90	60-90	30-70	10-25	4-15
107---------- Sawmill	0-46	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	80-100	30-50	15-30
	46-60	Stratified silty clay loam to loam.	CL	A-6, A-7	0	100	100	95-100	70-100	25-45	10-30
119C2---------- Elco	0-12	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	12-27	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	11-30
	27-67	Silty clay loam, loam, clay loam.	CL	A-7, A-6	0	100	90-100	80-100	60-95	25-50	11-30
123**. Riverwash											
125---------- Selma	0-22	Clay loam, loam	SC, CL	A-4, A-6	0	100	98-100	90-100	35-70	25-35	7-17
	22-45	Loam, clay loam, sandy loam.	CL, SC	A-6	0	100	95-100	90-100	38-75	24-36	11-19
	45-60	Stratified sand to silt loam.	CL, SC, SM, ML	A-4, A-6, A-2	0	90-100	85-100	65-100	18-67	<35	NP-21
145B, 145C2-------- Saybrook	0-11	Silt loam-------	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-40	5-15
	11-28	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	85-100	35-55	15-30
	28-60	Loam, silt loam, clay loam.	CL	A-6, A-4	0	95-100	85-100	80-95	60-85	20-40	8-25
152---------- Drummer	0-12	Silty clay loam	CL	A-6, A-7	0	100	95-100	85-100	72-95	30-50	15-30
	12-41	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	95-100	85-100	70-90	30-50	15-30
	41-47	Loam, silt loam, clay loam.	CL	A-6, A-7	0-5	95-100	90-100	75-95	60-85	30-50	15-30
	47-60	Stratified sandy loam to silty clay loam.	SC, CL	A-4, A-6	0-5	95-100	85-95	75-95	45-80	20-35	7-20
154A---------- Flanagan	0-12	Silt loam, silty clay loam.	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	15-30
	12-46	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	46-65	Loam, clay loam, silty clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-7	0	85-100	80-100	70-100	36-100	20-45	5-30
171A, 171B, 171C2-- Catlin	0-11	Silt loam-------	ML, CL, OL	A-6, A-7	0	100	100	95-100	85-100	30-50	11-20
	11-44	Silty clay loam	CL, CH	A-7, A-6	0	100	100	90-100	80-100	35-55	20-30
	44-60	Loam, clay loam, silt loam.	CL	A-6, A-7	0	95-100	90-100	85-100	65-100	25-45	11-20

See footnotes 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	
175B, 175C--------- Lamont	0-5	Sandy loam------	SM-SC, SC	A-2, A-4	0	100	100	80-95	25-50	15-25	5-10
	5-31	Sandy loam, loam, sandy clay loam.	SM-SC, SC	A-2, A-4	0	100	100	85-95	30-50	20-30	5-10
	31-60	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-3	0	100	100	70-90	5-25	---	NP
198---------- Elburn	0-21	Silt loam-------	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	21-51	Silty clay loam	CL	A-6, A-7	0	100	100	100	75-90	30-50	15-35
	51-70	Loam, sandy loam, gravelly sandy 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, 199C2-- Plano	0-14	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	14-46	Silty clay loam	CL	A-6	0	100	100	95-100	95-100	25-40	10-25
	46-62	Stratified silt loam to sandy loam.	ML, SM, CL, SC	A-4, A-2	0-5	90-100	80-90	60-90	30-70	<25	NP-10
219---------- Millbrook	0-12	Silt loam-------	CL, CL-ML	A-6, A-4	0	100	100	95-100	80-100	20-35	5-15
	12-33	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-98	30-45	10-25
	33-64	Stratified sandy loam to clay loam.	SM, SC, CL, ML	A-4, A-6, A-2	0-5	95-100	90-100	80-100	30-85	<30	NP-15
221B, 221C2-------- Parr	0-12	Loam------------	CL, CL-ML	A-4, A-6	0	100	95-100	80-100	50-90	22-34	6-15
	12-29	Clay loam-------	CL	A-6, A-7	0	90-100	90-95	80-90	65-75	35-50	17-31
	29-60	Loam------------	CL, ML, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	17-30	2-14
223B, 223C2-------- Varna	0-14	Silt loam-------	CL	A-6, A-4	0-5	95-100	95-100	95-100	85-95	25-40	8-20
	14-40	Silty clay, silty clay loam, clay.	CL, CH	A-7, A-6	0-10	95-100	95-100	90-98	80-98	33-56	15-29
	40-60	Silty clay loam, clay loam.	CL	A-7, A-6	0-10	95-100	95-100	90-98	80-95	30-45	13-26
233B, 233C2-------- Birkbeck	0-11	Silt loam-------	CL, ML	A-4, A-6	0	100	100	95-100	95-100	28-40	5-15
	11-44	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	95-100	95-100	85-100	30-50	10-25
	44-60	Clay loam, loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0-5	95-100	85-100	70-100	55-75	25-45	5-20
242A---------- Kendall	0-10	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	20-35	5-15
	10-43	Silty clay loam	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	43-61	Stratified sandy loam to silt loam.	CL, CL-ML, SM-SC, SC	A-2, A-4	0-5	90-100	80-90	60-90	30-70	<25	4-10
243A, 243B, 243C2-- St. Charles	0-13	Silt loam-------	CL-ML, CL, ML	A-4, A-6	0	100	100	95-100	95-100	20-35	3-15
	13-46	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	90-100	25-40	10-25
	46-60	Stratified silt loam to loamy sand.	ML, SC, SM, CL	A-2, A-4	0-5	90-100	80-90	60-90	20-70	<25	3-10

See footnotes 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	
259B, 259C2-------- Assumption	0-9	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	90-100	25-40	8-20
	9-25	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	25-63	Clay loam, silty clay loam.	CL	A-6, A-7	0-5	100	95-100	90-100	70-90	35-50	20-35
278A---------- Stronghurst	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-35	5-15
	11-44	Silty clay loam	CL	A-7	0	100	100	100	98-100	41-50	19-28
	44-66	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	98-100	95-100	26-37	5-15
279A---------- Rozetta	0-12	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	24-35	5-15
	12-49	Silty clay loam	CL	A-7	0	100	100	95-100	95-100	41-50	19-28
	49-60	Silt loam--------	CL, CL-ML	A-6, A-4	0	100	100	95-100	95-100	21-37	6-20
280B, 280C2, 280D2-- Fayette	0-11	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	11-44	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
	44-60	Silt loam--------	CL	A-6	0	100	100	100	95-100	30-40	10-20
290B---------- Warsaw	0-16	Loam------------	CL, CL-ML	A-4, A-6	0	80-100	75-100	70-100	50-90	25-35	4-12
	16-33	Sandy clay loam, sandy loam, gravelly clay loam.	SC, CL	A-6, A-2-6	0-3	90-95	70-95	60-90	30-70	25-35	10-20
	33-36	Sandy clay loam, sandy loam.	CL, SC, GC	A-6, A-2-6	0-5	70-90	60-90	55-70	30-60	25-35	10-15
	36-60	Stratified sand to very gravelly sand.	SP, GP, SP-SM, GP-GM	A-1	1-5	30-70	22-55	7-20	2-10	<20	NP
294B, 294C2-------- Symerton	0-17	Loam------------	CL, ML	A-7, A-6	0	95-100	95-100	90-100	60-95	35-50	11-20
	17-53	Sandy clay loam, clay loam, silty clay loam.	CL, CH	A-7, A-6	0-5	98-100	95-100	95-100	70-85	30-57	15-32
	53-60	Clay loam--------	CL	A-7, A-6	0-10	95-100	95-100	85-100	75-85	30-45	13-26
321---------- Du Page	0-35	Silt loam--------	CL	A-6, A-7	0	75-100	95-100	90-100	70-75	30-45	11-21
	35-47	Gravelly sandy loam, gravelly sandy clay loam, loam.	SM, SC, CL, ML	A-4, A-6, A-7	0	80-100	75-100	65-100	55-95	25-45	7-20
	47-60	Stratified loamy sand to gravelly sandy clay loam.	CL-ML, ML, CL, SM	A-4, A-6	0	80-100	80-100	65-100	40-75	10-40	5-20
324B, 324C2-------- Ripon	0-7	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	90-100	70-90	20-30	3-10
	7-24	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	70-95	25-40	10-20
	24-31	Clay loam, sandy clay loam, loam.	SC, CL	A-6	0-5	90-100	90-100	80-95	40-75	25-40	10-20
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
327B---------- Fox	0-5	Loam------------	ML, CL, CL-ML	A-4	0	95-100	85-100	75-95	55-90	20-30	3-10
	5-33	Clay loam, loam, gravelly clay loam.	CL, SC	A-2, A-6, A-7	0-5	85-100	75-95	50-95	20-65	25-45	10-25
	33-60	Sand and gravel	SP, SM, GP, GM	A-1, A-2, A-3	0-10	40-100	35-100	15-95	2-20	---	NP

See footnotes 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	
347---------- Canisteo	0-19	Clay loam-------	ML	A-7	0	95-100	95-100	85-100	60-90	40-50	15-20
	19-40	Silty clay loam, loam.	CL	A-6, A-7	0	95-100	90-100	85-95	65-85	35-50	15-25
	40-62	Clay loam, loam	CL	A-6	0-5	95-100	90-100	80-95	60-75	30-40	12-20
361B, 361C2, 361D2--- Kidder	0-5	Loam----------	ML, CL-ML, CL	A-4	0	95-100	95-100	85-100	60-90	20-30	3-10
	5-36	Clay loam, gravelly clay loam, loam.	CL, SC	A-6, A-4	0-5	75-100	75-100	65-95	45-70	25-40	8-15
	36-60	Sandy loam, gravelly sandy loam, fine sandy loam.	SM, GM	A-2, A-4	3-10	50-90	50-90	50-80	15-45	---	NP
363B, 363C2-------- Griswold	0-14	Loam----------	CL-ML, CL	A-4, A-6	0	95-100	95-100	90-100	70-90	20-30	5-15
	14-28	Loam, sandy clay loam, clay loam.	CL-ML, CL, SM-SC, SC	A-6, A-4	0-5	95-100	90-100	80-90	45-80	20-35	5-15
	28-34	Sandy loam------	SM, SC, SM-SC	A-2, A-4	0-10	85-95	65-85	50-75	20-45	<25	3-10
	34-60	Sandy loam, gravelly sandy loam.	SM, SC, SM-SC	A-2, A-4	0-10	85-95	65-85	50-75	20-45	<25	3-10
386A, 386B--------- Downs	0-7	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	7-47	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
	47-60	Silt loam-------	CL	A-6	0	100	100	100	95-100	30-40	10-20
387A, 387B--------- Ockley	0-9	Silt loam-------	CL, ML, CL-ML	A-4, A-6	0	100	95-100	80-100	60-90	22-33	3-12
	9-31	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	75-100	65-90	50-90	35-50	15-30
	31-55	Gravelly clay loam, clay loam.	CL, SC, GC	A-6, A-7	0-2	70-85	45-75	40-70	35-55	30-50	15-30
	55-60	Stratified sand to gravelly sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	20-55	5-20	2-10	---	NP
397B, 397D, 397F--- Boone	0-2	Sand----------	SM, SP-SM	A-2, A-3	0	100	100	65-80	5-35	---	NP
	2-34	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	50-75	5-30	---	NP
	34-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
398A, 398B--------- Wea	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	11-45	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0	95-100	90-95	85-95	65-90	35-50	15-30
	45-57	Gravelly loamy sand.	CL, SM-SC, SC, CL-ML	A-4, A-6, A-2	0-5	70-85	65-85	60-80	20-65	15-30	5-15
	57-60	Stratified sand to gravelly sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	20-55	5-20	0-10	---	NP

See footnotes 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	
410B, 410C2-------- Woodbine	0-5	Silt loam--------	CL-ML, CL	A-6, A-4	0	100	100	95-100	80-100	25-35	6-15
	5-18	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	90-100	35-45	16-26
	18-41	Clay loam, sandy clay loam, sandy loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-2	0-5	90-100	90-100	60-90	30-80	15-35	4-19
	41-47	Silty clay, cherty clay, clay.	CH, CL	A-7	0-10	75-100	75-100	70-95	60-90	40-60	20-35
	47	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
411B, 411C2-------- Ashdale	0-17	Silt loam--------	CL	A-4, A-6	0	100	100	100	95-100	30-40	8-18
	17-48	Silty clay loam	CL	A-7, A-6	0	100	100	100	95-100	35-50	15-30
	48-50	Silty clay, clay	CH	A-7	0-5	90-100	90-100	90-95	65-90	50-70	30-45
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
412B, 412C2-------- Ogle	0-11	Silt loam--------	CL	A-6	0	100	100	95-100	90-100	30-40	10-20
	11-43	Silty clay loam, silt loam.	CL	A-7	0	100	95-100	95-100	90-100	40-50	20-30
	43-65	Clay loam, loam, sandy clay loam.	CL	A-6, A-7	0	95-100	90-100	85-100	60-95	25-50	10-30
414B--------------- Myrtle	0-7	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	28-40	8-20
	7-32	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	90-100	35-50	15-30
	32-60	Loam, clay loam, sandy clay loam.	CL	A-6, A-7	0-5	95-100	90-100	85-100	60-95	25-45	11-25
415---------------- Orion	0-27	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	80-100	20-30	5-15
	27-59	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	85-100	85-100	20-30	5-15
	59-69	Silt loam, loam	CL, CL-ML	A-4, A-6	0	80-100	80-100	80-100	80-100	20-30	5-15
416B, 416C2-------- Durand	0-13	Silt loam--------	ML, CL	A-6, A-4	0	100	100	90-100	80-100	25-40	3-15
	13-20	Silty clay loam, silt loam.	CL	A-6	0	100	100	90-100	70-95	25-40	10-20
	20-60	Clay loam, loam, gravelly sandy clay loam.	CL, SC	A-6, A-7, A-2	0-5	90-100	70-100	65-90	30-70	30-45	10-20
419B, 419C2-------- Flagg	0-10	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	30-40	8-15
	10-40	Silty clay loam	CL	A-6, A-7	0	100	95-100	95-100	90-100	35-50	15-30
	40-60	Clay loam, sandy clay loam, silty clay loam.	CL	A-6	0	95-100	90-100	85-100	60-95	25-40	11-25
429B, 429C2-------- Palsgrove	0-10	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	23-35	5-14
	10-48	Silty clay loam	CL	A-7, A-6	0	100	100	100	95-100	36-46	17-27
	48-59	Clay------------	CH	A-7	0-5	90-95	90-95	90-95	65-90	50-70	30-45
	59	Weathered bedrock.	---	---	---	---	---	---	---	---	---
440A, 440B, 440C2-- Jasper	0-22	Loam, silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	22-37	Sandy clay loam, clay loam, silty clay loam.	SC, CL	A-6	0	100	100	80-95	45-85	20-35	10-20
	37-47	Sandy loam, loamy sand.	SC, SM-SC	A-4, A-2-4	0	100	100	60-70	20-40	20-30	5-10
	47-64	Stratified silt loam to sand.	SC, CL-ML, CL, SM-SC	A-4	0	100	100	75-90	35-85	<30	5-10

See footnotes at end of table.

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	
451---------- Lawson	0-59	Silt loam-------	CL, CL-ML	A-4	0	100	100	90-100	80-100	20-30	5-10
	59-75	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	90-100	80-100	35-50	15-30
490---------- Odell	0-13	Loam----------	ML, CL	A-4, A-6	0	100	100	90-100	70-95	30-40	8-14
	13-25	Clay loam, loam, silty clay loam.	CL	A-6, A-7	0	90-100	90-95	80-90	65-75	35-50	17-31
	25-60	Loam, clay loam	CL, ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	25-40	2-16
503B, 503C2-------- Rockton	0-22	Silt loam-------	ML, CL-ML, CL	A-4	0	90-100	90-100	85-95	50-75	25-35	5-10
	22-29	Loam, sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	90-100	90-100	75-90	45-70	30-45	10-20
	29	Weathered bedrock.	---	---	---	---	---	---	---	---	---
504D, 504F--------- Sogn	0-10	Loam----------	CL	A-6, A-7	0-10	85-100	85-100	85-100	80-95	25-45	11-23
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
505C2, 505E2------- Dunbarton	0-5	Silty clay loam	CL	A-6	0-10	70-100	70-100	70-100	70-95	25-40	11-20
	5-10	Silty clay loam	CL	A-6	0-10	70-100	70-100	70-100	70-95	25-40	11-20
	10-16	Clay, silty clay, silty clay loam.	CH	A-7	0-10	70-100	70-100	70-100	70-95	50-61	24-35
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
509B, 509C2, 509D2, 509E2---------- Whalan	0-7	Loam----------	ML	A-4	0	100	95-100	85-95	60-90	30-40	5-10
	7-25	Clay loam, loam	CL	A-6	0	95-100	95-100	80-95	70-90	30-40	10-15
	25-29	Clay loam, clay, silty clay.	CL, CH	A-7	0-5	80-100	70-95	65-90	50-85	40-60	20-35
	29	Weathered bedrock.	---	---	---	---	---	---	---	---	---
570A, 570B, 570C2, 570D2---------- Martinsville	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	90-100	80-100	60-90	22-33	4-12
	11-26	Clay loam, silty clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	100	90-100	65-90	40-90	20-35	8-20
	26-47	Sandy loam, sandy clay loam, loam.	SM, ML	A-2-4, A-4	0	100	90-100	60-80	30-60	30-40	2-8
	47-60	Stratified silty clay loam to sandy loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	95-100	85-100	80-95	40-85	<25	4-15
661B, 661C2-------- Atkinson	0-14	Silt loam-------	CL	A-6	0	100	95-100	85-95	55-75	25-35	10-20
	14-39	Silt loam, clay loam, sandy clay loam.	CL	A-6	2-5	90-95	80-95	80-90	50-65	30-40	10-20
	39-43	Silty clay------	CH	A-7	2-10	85-95	80-95	80-90	70-90	55-70	30-45
	43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnotes 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	
727B---------- Waukee	0-15	Loam----------	CL	A-6	0	100	90-100	70-90	50-75	30-40	10-20
	15-30	Loam, sandy clay loam.	CL, SM-SC, SC, CL-ML	A-6, A-4	0-5	85-95	80-95	65-85	40-60	20-35	5-15
	30-60	Gravelly sand, loamy sand.	SW, SM, SP-SM, SP	A-1	2-10	60-90	60-85	20-40	3-25	---	NP
728C2---------- Winnebago	0-9	Silt loam-------	ML, CL	A-6, A-4	0	100	95-100	95-100	90-100	30-40	5-15
	9-68	Clay loam, sandy clay loam, gravelly clay loam.	SC, CL	A-6, A-2	0-5	70-95	60-90	45-80	30-60	28-40	12-22
742B, 742C--------- Dickinson	0-20	Sandy loam------	SM, SC, SM-SC	A-2, A-4	0	100	100	80-95	30-50	15-30	NP-10
	20-50	Fine sandy loam, sandy loam, loamy sand.	SM, SP, SM-SC	A-2, A-3	0	100	100	80-95	3-20	10-20	NP-5
	50-63	Loam----------	CL	A-6	2-5	90-95	85-95	80-90	55-65	25-35	11-20
761B, 761D, 761F--- Eleva	0-7	Sandy loam------	SM, SM-SC	A-2, A-4	0	100	95-100	60-90	25-50	<20	2-7
	7-21	Loam, sandy loam, fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0	100	90-100	60-95	25-65	<25	NP-7
	21-35	Sand, fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	80-100	50-85	5-35	<20	NP-4
	35	Weathered bedrock.	---	---	---	---	---	---	---	---	---
776---------- Comfrey	0-35	Clay loam, loam	OL, OH, MH, ML	A-7	0	100	100	85-98	65-85	45-60	12-20
	35-60	Clay loam, loam	CL	A-7, A-6	0	100	100	80-98	60-85	35-50	12-25
779B, 779D--------- Chelsea	0-3	Loamy sand------	SM, SP-SM	A-2-4	0	100	100	65-80	10-35	---	NP
	3-60	Fine sand, sand, loamy sand.	SP, SM, SP-SM	A-3, A-2-4	0	100	100	65-80	3-15	---	NP
802**. Orthents											
864**, 865**. Pits											
919C**, 919E**: Rodman----------	0-8	Gravelly loam---	ML, CL, SM, SC	A-4	0-2	70-85	65-85	60-80	36-65	<30	3-9
	8-60	Stratified gravelly coarse sand to very gravelly loamy coarse sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	22-55	7-20	2-15	<25	NP-4
Fox----------	0-5	Loam----------	ML, CL, CL-ML	A-4	0	95-100	85-100	75-95	55-90	20-30	3-10
	5-33	Clay loam, loam, sandy clay loam.	CL, SC	A-2, A-6, A-7	0-5	85-100	75-95	50-95	20-65	25-45	10-25
	33-60	Sand and gravel	SP, SM, GP, GM	A-1, A-2, A-3	0-10	40-100	35-100	15-95	2-20	---	NP

See footnotes 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	
939C**, 939E**:											
Rodman	0-8	Gravelly loam	ML, CL, SM, SC	A-4	0-2	70-85	65-85	60-80	36-65	<30	3-9
	8-60	Stratified gravelly coarse sand to very gravelly loamy coarse sand.	SP, SP-SM, GP, GP-GM	A-1	1-5	30-70	22-55	7-20	2-15	<25	NP-4
Warsaw	0-14	Loam	CL, CL-ML	A-4, A-6	0	80-100	75-100	70-100	50-90	25-35	4-12
	14-24	Sandy clay loam, loam, gravelly clay loam.	SC, CL	A-6, A-2-6	0-3	90-95	70-95	60-90	30-70	25-35	10-20
	24-32	Gravelly sandy clay loam, gravelly loam.	CL, SC, GC	A-6, A-2-6	0-5	70-90	60-85	55-70	30-60	25-35	10-15
	32-60	Stratified sand to very gravelly sand.	SP, GP, SP-SM, GP-GM	A-1	1-5	30-70	22-55	7-20	2-10	<20	NP
4776 Comfrey	0-35	Clay loam	OL, OH, MH, ML	A-7	0	100	100	85-98	65-85	45-60	12-20
	35-60	Stratified loam to sand.	CL	A-7, A-6	0	100	100	80-98	60-85	35-50	12-25
6506B, 6506C Hitt Variant	0-15	Sandy loam	SM, SC, SM-SC	A-4, A-2	0	100	100	80-95	30-50	15-30	NP-10
	15-31	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	80-95	30-50	15-30	NP-10
	31-40	Loam, clay loam, sandy clay loam	CL	A-6, A-7	0-5	90-100	85-100	80-95	55-80	25-45	11-20
	40-44	Silty clay, clay	CH, CL	A-7	0-10	90-100	90-100	80-95	60-90	40-60	20-35
	44-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* NP means nonplastic.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more 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		Organic matter
						K	T	
	In	In/hr	In/in	pH				Pct
21B, 21C2, 21D2--	0-11	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	4-3	1-3
Pecatonica	11-22	0.6-2.0	0.17-0.22	4.5-6.5	Low----------	0.37		
	22-33	0.6-2.0	0.15-0.19	4.5-6.5	Moderate-------	0.37		
	33-60	0.6-2.0	0.07-0.15	4.5-8.4	Low----------	0.28		
22C2, 22D2-------	0-9	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.37	5	1-3
Westville	9-29	0.6-2.0	0.15-0.19	5.1-7.3	Moderate-------	0.37		
	29-60	0.6-2.0	0.07-0.15	6.6-8.4	Low----------	0.28		
24B, 24C2--------	0-11	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	1-3
Dodge	11-29	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-------	0.37		
	29-33	0.6-2.0	0.16-0.19	5.1-6.5	Moderate-------	0.37		
	33-60	0.6-2.0	0.07-0.20	7.9-8.4	Low----------	0.37		
27B, 27C2, 27D2, 27E2----------	0-8	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	1-2
Miami	8-34	0.6-2.0	0.15-0.20	5.6-7.3	Moderate-------	0.37		
	34-60	0.6-2.0	0.05-0.19	6.6-8.4	Low----------	0.37		
29D2----------	0-6	0.6-2.0	0.20-0.22	5.6-6.5	Low----------	0.37	4	1-3
Dubuque	6-27	0.6-2.0	0.18-0.20	5.6-6.0	Moderate-------	0.37		
	27-32	0.06-0.2	0.12-0.15	5.6-6.0	High----------	0.37		
	32	---	---	---	----------	---		
36A, 36B, 36C2---	0-17	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-------	0.32	5	2-5
Tama	17-53	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	53-68	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
41----------	0-16	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-------	0.28	5	5-6
Muscatine	16-50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.43		
	50-60	0.6-2.0	0.18-0.20	6.6-7.8	Moderate-------	0.43		
55B----------	0-11	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	3-4
Sidell	11-28	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-------	0.43		
	28-58	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-------	0.43		
	58-60	0.6-2.0	0.05-0.19	7.4-8.4	Low----------	0.43		
60C2----------	0-8	0.6-2.0	0.20-0.24	6.1-7.3	Low----------	0.32	5	2-4
La Rose	8-20	0.6-2.0	0.15-0.20	5.6-7.8	Low----------	0.32		
	20-60	0.6-2.0	0.07-0.09	7.4-8.4	Low----------	0.32		
61----------	0-13	0.6-2.0	0.22-0.24	5.6-6.5	Low----------	0.32	5	2-4
Atterberry	13-49	0.2-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	49-60	0.6-2.0	0.20-0.22	6.1-7.8	Low----------	0.43		
68----------	0-20	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	5-6
Sable	20-40	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-------	0.28		
	40-60	0.6-2.0	0.20-0.22	6.6-7.8	Low----------	0.28		
73----------	0-32	0.6-2.0	0.19-0.24	6.1-7.8	Low----------	0.24	5	3-5
Ross	32-63	0.6-2.0	0.16-0.22	6.1-7.8	Low----------	0.24		
74----------	0-28	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	2-3
Radford	28-60	0.6-2.0	0.18-0.20	6.6-7.8	Moderate-------	0.28		
77----------	0-50	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	3-4
Huntsville	50-60	0.6-2.0	0.12-0.21	6.1-7.8	Low----------	0.28		
82----------	0-19	0.6-2.0	0.20-0.24	7.4-8.4	Low----------	0.28	5	4-6
Millington	19-38	0.6-2.0	0.17-0.20	7.4-8.4	Moderate-------	0.28		
	38-61	0.6-2.0	0.14-0.20	7.4-8.4	Low----------	0.28		
87B, 87C----------	0-23	2.0-6.0	0.12-0.15	5.1-7.3	Low----------	0.20	4	1-3
Dickinson	23-46	6.0-20	0.08-0.10	5.6-6.5	Low----------	0.20		
	46-60	6.0-20	0.02-0.04	5.1-6.5	Low----------	0.15		

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF 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
88B----------	0-17	2.0-6.0	0.10-0.12	5.1-7.3	Low----------	0.17	5	1-2
Sparta	17-31	6.0-20	0.06-0.11	5.1-6.0	Low----------	0.17		
	31-60	6.0-20	0.05-0.07	5.1-6.0	Low----------	0.17		
102----------	0-18	0.6-2.0	0.20-0.24	6.1-7.8	Low----------	0.28	5	3-4
La Hogue	18-42	0.6-2.0	0.12-0.20	5.1-7.8	Moderate-------	0.28		
	42-62	0.6-2.0	0.05-0.22	5.6-8.4	Low----------	0.17		
103----------	0-60	0.2-6.0	0.35-0.45	5.6-7.8	----------	---	---	20-70
Houghton								
105B----------	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.32	5	2-3
Batavia	11-46	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.43		
	46-60	0.6-2.0	0.07-0.11	5.1-7.3	Low----------	0.43		
107----------	0-46	0.6-2.0	0.18-0.23	6.1-7.8	Moderate-------	0.28	5	4-5
Sawmill	46-60	0.6-2.0	0.11-0.20	7.4-8.4	Moderate-------	0.28		
119C2----------	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	4	1-3
Elco	12-27	0.6-2.0	0.18-0.21	5.1-7.3	Moderate-------	0.37		
	27-67	0.2-0.6	0.14-0.20	5.1-7.3	Moderate-------	0.37		
123*.								
Riverwash								
125----------	0-22	0.6-2.0	0.17-0.22	6.1-7.8	Moderate-------	0.28	5	4-6
Selma	22-45	0.6-2.0	0.15-0.19	6.1-7.8	Moderate-------	0.28		
	45-60	0.6-6.0	0.05-0.22	6.1-7.8	Low----------	0.28		
145B----------	0-11	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.28	5	3-4
Saybrook	11-34	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-------	0.43		
	34-60	0.6-2.0	0.15-0.21	5.6-8.4	Low----------	0.43		
145C2----------	0-8	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.28	5	3-4
Saybrook	8-28	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-------	0.43		
	28-60	0.6-2.0	0.15-0.21	5.6-8.4	Low----------	0.43		
152----------	0-12	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-------	0.28	5	5-7
Drummer	12-41	0.6-2.0	0.21-0.24	5.6-7.3	Moderate-------	0.28		
	41-47	0.6-2.0	0.17-0.20	6.1-8.4	Moderate-------	0.28		
	47-60	0.6-2.0	0.11-0.19	6.6-8.4	Low----------	0.28		
154A----------	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.28	5	4-5
Flanagan	12-46	0.6-2.0	0.15-0.22	5.6-7.3	High----------	0.43		
	46-65	0.6-2.0	0.15-0.22	6.1-8.4	Low----------	0.43		
171A, 171B, 171C2----------	0-11	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.28	5	3-4
Catlin	11-44	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
	44-60	0.6-2.0	0.07-0.11	6.6-8.4	Low----------	0.43		
175B, 175C----------	0-5	2.0-6.0	0.13-0.15	5.1-7.3	Low----------	0.24	5	.5-2
Lamont	5-31	2.0-6.0	0.14-0.16	5.1-6.0	Low----------	0.24		
	31-60	>20	0.09-0.11	5.1-6.5	Low----------	0.17		
198----------	0-21	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.28	5	4-5
Elburn	21-51	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-------	0.43		
	51-70	0.6-2.0	0.12-0.18	6.1-8.4	Low----------	0.43		
199A, 199B----------	0-14	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	5	3-5
Plano	14-46	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.43		
	46-62	0.6-2.0	0.11-0.22	6.1-8.4	Low----------	0.43		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF 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
219----------	0-12	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	5	2-4
Millbrook	12-33	0.2-2.0	0.15-0.20	5.6-7.3	Moderate-------	0.43		
	33-64	0.2-2.0	0.11-0.22	6.1-8.4	Low----------	0.32		
221B, 221C2------	0-12	0.6-2.0	0.21-0.24	5.6-6.0	Low----------	0.32	5-4	2-4
Parr	12-29	0.6-2.0	0.15-0.19	5.6-6.5	Moderate-------	0.32		
	29-60	0.6-2.0	0.05-0.19	7.4-8.4	Low----------	0.32		
223B, 223C2------	0-14	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	4-3	3-4
Varna	14-40	0.2-0.6	0.09-0.19	5.6-7.3	Moderate-------	0.32		
	40-60	0.06-0.2	0.14-0.20	6.6-8.4	Low----------	0.32		
233B, 233C2------	0-11	0.6-2.0	0.22-0.24	5.1-6.5	Low----------	0.37	5	1-3
Birkbeck	11-44	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-------	0.37		
	44-60	0.6-2.0	0.14-0.20	5.6-7.8	Low----------	0.37		
242A----------	0-10	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.37	5	1-3
Kendall	10-43	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		
	43-61	0.6-2.0	0.11-0.22	6.6-8.4	Low----------	0.37		
243A, 243B, 243C2----------	0-13	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5-4	1-3
St. Charles	13-46	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.37		
	46-60	0.6-2.0	0.11-0.22	5.1-7.8	Low----------	0.37		
259B, 259C2------	0-9	0.6-2.0	0.22-0.24	5.6-6.5	Low----------	0.32	4-3	3-4
Assumption	9-25	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-------	0.43		
	25-63	0.2-0.6	0.14-0.20	5.1-6.5	Moderate-------	0.43		
278A----------	0-11	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	1-3
Stronghurst	11-44	0.2-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.37		
	44-66	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37		
279A----------	0-12	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	1-2
Rozetta	12-49	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.37		
	49-60	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37		
280B, 280C2, 280D2----------	0-11	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.37	5	1-2
Fayette	11-44	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-------	0.37		
	44-60	0.6-2.0	0.18-0.20	5.1-7.8	Moderate-------	0.37		
290B----------	0-16	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	4-3	2-4
Warsaw	16-33	0.6-2.0	0.16-0.19	5.1-7.8	Low----------	0.28		
	33-36	0.6-2.0	0.15-0.17	6.6-8.4	Low----------	0.28		
	36-60	>20	0.02-0.04	7.9-8.4	Low----------	0.10		
294B, 294C2------	0-17	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.32	4-3	3-4
Symerton	17-53	0.6-2.0	0.15-0.20	5.6-7.8	Moderate-------	0.32		
	53-60	0.2-0.6	0.18-0.20	7.4-8.4	Moderate-------	0.43		
321----------	0-35	0.6-2.0	0.22-0.24	7.4-8.4	Moderate-------	0.28	5	3-5
Du Page	35-47	0.6-2.0	0.10-0.20	7.4-8.4	Low----------	0.28		
	47-60	0.6-2.0	0.08-0.20	7.9-8.4	Low----------	0.28		
324B, 324C2------	0-7	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.32	4	2-4
Ripon	7-24	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-------	0.32		
	24-31	0.6-2.0	0.16-0.18	6.6-8.4	Moderate-------	0.32		
	31	---	---	---	----------	---		
327B----------	0-5	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.32	4	1-3
Fox	5-33	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-------	0.32		
	33-60	>6.0	0.02-0.04	7.9-8.4	Low----------	0.10		
347----------	0-19	0.6-2.0	0.18-0.22	7.4-8.4	Moderate-------	0.24	5	4-8
Canisteo	19-40	0.6-2.0	0.15-0.19	7.4-8.4	Moderate-------	0.32		
	40-62	0.6-2.0	0.14-0.16	7.4-8.4	Low----------	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF 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
361B, 361C2, 361D2----------	0-5	0.6-2.0	0.20-0.24	6.1-7.8	Low----------	0.32	5	1-3
Kidder	5-36	0.6-2.0	0.15-0.19	5.6-7.8	Moderate-------	0.32		
	36-60	2.0-6.0	0.09-0.11	7.4-8.4	Low----------	0.32		
363B, 363C2------	0-14	0.6-2.0	0.16-0.22	5.6-7.3	Low----------	0.32	5	2-4
Griswold	14-28	0.6-2.0	0.14-0.19	5.6-7.3	Low----------	0.32		
	28-34	0.6-2.0	0.11-0.13	6.6-7.8	Low----------	0.32		
	34-60	0.6-2.0	0.11-0.13	7.4-8.4	Low----------	0.32		
386A, 386B-------	0-7	0.6-2.0	0.21-0.23	5.1-7.3	Low----------	0.32	5	2-3
Downs	7-47	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-------	0.43		
	47-60	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
387A, 387B-------	0-9	0.6-2.0	0.20-0.24	5.6-6.5	Low----------	0.37	5	.5-1
Ockley	9-31	0.6-2.0	0.15-0.20	4.5-6.0	Moderate-------	0.37		
	31-55	0.6-2.0	0.12-0.14	5.6-6.5	Moderate-------	0.24		
	55-60	>20	0.02-0.04	7.4-8.4	Low----------	0.10		
397B, 397D, 397F-	0-2	6.0-20	0.08-0.10	5.1-6.5	Low----------	0.15	3	<1
Boone	2-34	6.0-20	0.06-0.08	5.1-6.5	Low----------	0.15		
	34-60	---	---	---	----------	---		
398A, 398B-------	0-11	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.32	5	2-3
Wea	11-45	0.6-2.0	0.15-0.20	5.1-6.5	Moderate-------	0.43		
	45-57	0.6-2.0	0.10-0.12	6.1-8.4	Low----------	0.24		
	57-60	>20	0.02-0.04	7.4-8.4	Low----------	0.10		
410B, 410C2------	0-5	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.37	4	1-2
Woodbine	5-18	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-------	0.37		
	18-41	0.6-2.0	0.12-0.19	5.6-6.5	Moderate-------	0.37		
	41-47	0.06-0.2	0.08-0.12	5.6-6.5	High----------	0.37		
	47	---	---	---	----------	---		
411B, 411C2------	0-17	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	4	3-5
Ashdale	17-48	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	48-50	0.06-0.6	0.09-0.13	5.6-7.3	High----------	0.32		
	50	---	---	---	----------	---		
412B, 412C2------	0-11	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.28	5	3-5
Ogle	11-43	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-------	0.43		
	43-65	0.6-2.0	0.07-0.10	5.6-7.3	Moderate-------	0.43		
414B-------------	0-7	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.32	5	2-3
Myrtle	7-32	0.6-2.0	0.18-0.20	4.5-6.0	Moderate-------	0.43		
	32-60	0.6-2.0	0.07-0.10	4.5-7.8	Moderate-------	0.43		
415--------------	0-27	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.37	5	1-3
Orion	27-59	0.6-2.0	0.18-0.22	5.6-7.8	Low----------	0.37		
	59-69	0.6-2.0	0.20-0.22	5.6-7.8	Low----------	0.37		
416B, 416C2------	0-13	0.6-2.0	0.22-0.24	5.1-6.5	Low----------	0.32	5	3-4
Durand	13-20	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-------	0.32		
	20-60	0.6-2.0	0.12-0.19	5.1-6.5	Moderate-------	0.32		
419B, 419C2------	0-10	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	1-3
Flagg	10-40	0.6-2.0	0.14-0.20	4.5-6.0	Moderate-------	0.37		
	40-60	0.6-2.0	0.07-0.10	5.1-6.0	Low----------	0.37		
429B, 429C2------	0-10	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	4	1-2
Palsgrove	10-48	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-------	0.43		
	48-59	<0.06	0.08-0.10	5.6-7.3	High----------	0.32		
	59	---	---	---	----------	---		
440A, 440B, 440C2----------	0-22	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.28	5	2-4
Jasper	22-37	0.6-2.0	0.16-0.18	5.1-6.0	Low----------	0.28		
	37-47	0.6-2.0	0.14-0.16	5.6-7.3	Low----------	0.28		
	47-64	0.6-2.0	0.19-0.21	6.1-7.8	Low----------	0.28		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF 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
451----------	0-59	0.6-2.0	0.22-0.24	6.1-7.8	Low----------	0.28	5	3-5
Lawson	59-75	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-------	0.28		
490----------	0-13	0.6-2.0	0.21-0.24	5.6-7.3	Low----------	0.32	5-4	4-5
Odell	13-25	0.2-0.6	0.15-0.19	5.6-6.5	Moderate-------	0.32		
	25-60	0.2-0.6	0.05-0.19	6.6-8.4	Low----------	0.32		
503B, 503C2------	0-22	0.6-2.0	0.20-0.22	5.1-6.5	Low----------	0.28	4	2-6
Rockton	22-29	0.6-2.0	0.17-0.19	5.1-6.5	Moderate-------	0.28		
	29	---	---	---	---	---		
504D, 504F-------	0-10	0.6-2.0	0.17-0.22	6.1-8.4	Moderate-------	0.28	1	2-4
Sogn	10	---	---	---	---	---		
505C2, 505E2-----	0-5	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-------	0.37	2	1-2
Dunbarton	5-10	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-------	0.37		
	10-16	0.2-0.6	0.09-0.13	5.6-7.8	High-----------	0.37		
	16	---	---	---	---	---		
509B, 509C2, 509D2, 509E2----	0-7	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	4	1-2
Whalan	7-25	0.6-2.0	0.17-0.19	5.1-6.5	Low----------	0.32		
	25-29	0.06-0.2	0.15-0.19	5.6-7.8	High-----------	0.32		
	29	---	---	---	---	---		
570A, 570B, 570C2, 570D2----	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	1-2
Martinsville	11-26	0.6-2.0	0.17-0.20	5.1-6.0	Moderate-------	0.37		
	26-47	0.6-2.0	0.12-0.14	5.6-6.5	Low----------	0.24		
	47-60	0.6-2.0	0.19-0.21	7.4-8.4	Low----------	0.24		
661B, 661C2------	0-14	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.28	4	3-4
Atkinson	14-39	0.6-2.0	0.17-0.19	5.6-6.0	Low----------	0.28		
	39-43	0.06-0.2	0.12-0.15	6.6-7.3	High-----------	0.28		
	43	---	---	---	---	---		
727B----------	0-15	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.24	4	3-4
Waukee	15-30	0.6-2.0	0.15-0.19	5.1-6.0	Low----------	0.32		
	30-60	>20	0.02-0.06	5.1-6.0	Low----------	0.10		
728C2----------	0-9	0.6-2.0	0.15-0.22	5.1-6.5	Low----------	0.32	5	3-4
Winnebago	9-68	0.6-2.0	0.15-0.19	5.1-6.0	Moderate-------	0.32		
742B, 742C-------	0-20	2.0-6.0	0.12-0.15	5.6-6.5	Low----------	0.20	4	1-2
Dickinson	20-50	6.0-20	0.08-0.10	5.1-6.0	Low----------	0.20		
	50-63	0.6-2.0	0.17-0.19	5.6-6.5	Low----------	0.37		
761B, 761D, 761F-	0-7	2.0-6.0	0.13-0.18	5.1-7.3	Low----------	0.24	4	1-3
Eleva	7-21	2.0-6.0	0.12-0.19	5.1-6.5	Low----------	0.24		
	21-35	6.0-20	0.05-0.10	5.1-6.5	Low----------	0.15		
	35	---	---	---	---	---		
776----------	0-35	0.6-2.0	0.18-0.22	6.6-7.8	Moderate-------	0.28	5	6-10
Comfrey	35-60	0.6-2.0	0.15-0.19	6.6-8.4	Moderate-------	0.28		
779B, 779D-------	0-3	6.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	5	.5-1
Chelsea	3-60	6.0-20	0.06-0.08	5.1-6.0	Low----------	0.17		
802*. Orthents								
864*, 865*. Pits								
919C*, 919E*:								
Rodman----------	0-8	2.0-6.0	0.10-0.12	6.6-7.8	Low----------	0.20	3	2-4
	8-60	>20	0.02-0.04	7.4-8.4	Low----------	0.10		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF 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
919C*, 919E*:								
Fox	0-5	0.6-2.0	0.20-0.24	5.1-7.3	Low	0.32	4	1-3
	5-33	0.6-2.0	0.15-0.19	5.6-7.8	Moderate	0.32		
	33-60	>6.0	0.02-0.04	7.9-8.4	Low	0.10		
939C*, 939E*:								
Rodman	0-8	2.0-6.0	0.10-0.12	6.6-7.8	Low	0.20	3	2-4
	8-60	>20	0.02-0.04	7.4-8.4	Low	0.10		
Warsaw	0-14	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.28	4-3	2-4
	14-24	0.6-2.0	0.16-0.19	5.1-7.8	Low	0.28		
	24-32	0.6-2.0	0.15-0.17	6.6-8.4	Low	0.28		
	32-60	>20	0.02-0.04	7.9-8.4	Low	0.10		
4776	0-35	0.6-2.0	0.18-0.22	6.6-7.8	Moderate	0.28	5	6-10
Comfrey	35-60	0.6-2.0	0.15-0.19	6.6-8.4	Moderate	0.28		
6506B, 6506C	0-15	2.0-6.0	0.13-0.18	5.6-6.5	Low	0.20	4	2-3
Hitt Variant	15-31	2.0-6.0	0.12-0.17	5.1-6.5	Low	0.20		
	31-40	0.6-2.0	0.15-0.19	5.1-6.0	Moderate	0.32		
	40-44	0.06-0.2	0.08-0.12	5.6-7.3	Moderate	0.32		
	44-60							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the text explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

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	Hardness		Uncoated steel	Concrete
					Ft			In				
21B, 21C2, 21D2--- Pecatonica	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
22C2 22D2-------- Westville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
24B, 24C2--------- Dodge	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
27B, 27C2, 27D2, 27E2---------- Miami	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
29D2---------- Dubuque	B	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate	Moderate.
36A, 36B, 36C2---- Tama	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
41---------- Muscatine	B	None--------	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
55B---------- Sidell	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
60C2---------- La Rose	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
61---------- Atterberry	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
68*---------- Sable	B/D	Occasional	Brief-----	Mar-Jun	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
73---------- Ross	B	Frequent----	Very brief	Nov-Jun	>6.0	---	---	>60	---	Moderate	Low------	Low.
74---------- Radford	B	Frequent----	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.
82*---------- Millington	B	Frequent----	Brief-----	Apr-Jun	+.5-2.0	Apparent	Mar-Jul	>60	---	High-----	High-----	Low.
87B, 87C---------- Dickinson	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
88B---------- Sparta	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Moderate.

See footnote at end of table.

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	Hardness		Uncoated steel	Concrete
					Ft			In				
102---------- La Hogue	B	None--------	---	---	1.0-3.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Moderate.
103*---------- Houghton	A/D	Frequent----	Long------	Nov-May	+1-1.0	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.
105B---------- Batavia	B	None--------	---	---	>6.0	---	---	>60	---	High-----	High-----	Moderate.
107---------- Sawmill	B/D	Frequent----	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
119C2---------- Elco	B	None--------	---	---	2.5-5.0	Apparent	Mar-May	>60	---	High-----	High-----	Moderate.
123**. Riverwash												
125*---------- Selma	B/D	Occasional	Brief-----	Apr-Jun	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
145B, 145C2------- Saybrook	B	None--------	---	---	4.0-6.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
152*---------- Drummer	B/D	Occasional	Brief-----	Mar-Jun	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
154A---------- Flanagan	B	None--------	---	---	1.0-3.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Moderate.
171A, 171B, 171C2- Catlin	B	None--------	---	---	3.0-6.0	Apparent	Feb-May	>60	---	High-----	High-----	Moderate.
175B, 175C-------- Lamont	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
198---------- Elburn	B	None--------	---	---	1.0-3.0	Apparent	Jan-May	>60	---	High-----	High-----	Moderate.
199A, 199B, 199C2- Plano	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Low.
219---------- Millbrook	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
221B, 221C2------- Parr	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
223B, 223C2------- Varna	C	None--------	---	---	3.0-6.0	Perched	Mar-May	>60	---	High-----	Moderate	Moderate.
233B, 233C2------- Birkbeck	B	None--------	---	---	2.5-6.0	Apparent	Mar-May	>60	---	High-----	High-----	Moderate.

See footnotes at end of table.

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	Hardness		Uncoated steel	Concrete
					Ft			In				
242A---------- Kendall	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
243A, 243B, 243C2- St. Charles	B	None--------	---	---	3.0-6.0	Apparent	Feb-Jun	>60	---	High-----	Moderate	Moderate.
259B, 259C2------- Assumption	B	None--------	---	---	3.0-4.5	Perched	Feb-May	>60	---	High-----	High-----	Moderate.
278A---------- Stronghurst	B	None--------	---	---	1.0-3.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Moderate.
279A---------- Rozetta	B	None--------	---	---	3.0-4.0	Apparent	Apr-Jun	>60	---	High-----	Moderate	Moderate.
280B, 280C2, 280D2---------- Fayette	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
290B---------- Warsaw	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
294B, 294C2------- Symerton	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
321---------- Du Page	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Low.
324B, 324C2------- Ripon	B	None--------	---	---	>6.0	---	---	20-40	Hard	High-----	Moderate	Moderate.
327B---------- Fox	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
347*---------- Canisteo	C/D	Frequent----	Brief-----	Mar-Jun	+.5-1.0	Apparent	Oct-Jul	>60	---	High-----	High-----	Low.
361B, 361C2, 361D2---------- Kidder	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
363B, 363C2------- Griswold	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Low.
386A, 386B-------- Downs	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
387A, 387B-------- Ockley	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
397B, 397D, 397F-- Boone	A	None--------	---	---	>6.0	---	---	20-40	Rippable	Low------	Low------	Moderate.

See footnote at end of table.

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	Hardness		Uncoated steel	Concrete
					Ft			In				
398A, 398B-------- Wea	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
410B, 410C2------- Woodbine	B	None---------	---	---	>6.0	---	---	40-60	Hard	Moderate	High------	Moderate.
411B, 411C2------- Ashdale	B	None---------	---	---	>6.0	---	---	40-60	Hard	High------	Moderate	Moderate.
412B, 412C2------- Ogle	B	None---------	---	---	>6.0	---	---	>60	---	High------	Moderate	Moderate.
414B--------------- Myrtle	B	None---------	---	---	>6.0	---	---	>60	---	High------	Moderate	Moderate.
415--------------- Orion	C	Frequent-----	Brief------	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High------	High------	Low.
416B, 416C2------- Durand	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
419B, 419C2------- Flagg	B	None---------	---	---	>6.0	---	---	>60	---	High------	Moderate	Moderate.
429B, 429C2------- Palsgrove	B	None---------	---	---	>6.0	---	---	40-60	Hard	High------	High------	Moderate.
440A, 440B, 440C2- Jasper	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
451--------------- Lawson	B	Occasional	Brief------	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High------	Moderate	Low.
490--------------- Odell	B	None---------	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High------	High------	Moderate.
503B, 503C2------- Rockton	B	None---------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low-------	Low.
504D, 504F-------- Sogn	D	None---------	---	---	>6.0	---	---	4-20	Hard	Moderate	Low-------	Low.
505C2, 505E2------ Dunbarton	C	None---------	---	---	>6.0	---	---	12-20	Rippable	Moderate	Moderate	Low.
509B, 509C2, 509D2, 509E2------ Whalan	B	None---------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Moderate	Low.

See footnote at end of table.

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	Hardness		Uncoated steel	Concrete
					Ft			In				
570A, 570B, 570C2, 570D2---------- Martinsville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
661B, 661C2------- Atkinson	B	None--------	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.
727B---------- Waukee	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Moderate.
728C2---------- Winnebago	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
742B, 742C-------- Dickinson	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
761B, 761D, 761F-- Eleva	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Moderate.
776---------- Comfrey	B/D	Occasional	Brief to long.	Apr-Jul	0-1.0	Apparent	Apr-Jul	>60	---	High-----	High-----	Low.
779B, 779D-------- Chelsea	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
802**. Orthents												
864**, 865**. Pits												
919C**, 919E**: Rodman----------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
Fox----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
939C**, 939E**: Rodman----------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
Warsaw----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
4776*---------- Comfrey	B/D	Frequent----	Brief to long.	Apr-Jul	+.5-1.0	Apparent	Apr-Jul	>60	---	High-----	High-----	Low.
6506B, 6506C------ Hitt Variant	A	None--------	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Moderate.

* A plus sign under "Depth to high water table" indicates ponding.
** See description of the map unit composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

Soil name and location	Parent material	Report number	Depth	Moisture density		Percentage passing sieve--				Percentage smaller than--				Liquid limit	Plasticity index	Classification	
				Maximum dry	Optimum moisture	No. 4	No. 10	No. 40	No. 200	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO	Unified
			In	Lb/cu ft	Pct									Pct			
Atkinson silt loam:																	
Ogle County; 1,330 feet west and 1,245 feet south of the NE corner, sec. 5, T. 40 N., R. 2 E.	Glacial outwash and residuum over limestone bedrock.	1-1	0-10	104	18	100	100	97	85	74	52	30	20	33	10	A-6(8)	CL
		1-4	20-30	106	18	98	98	94	78	75	53	34	28	46	22	A-7-6 (16)	CL
		1-7	39-43	95	25	99	99	95	74	65	56	50	42	52	27	A-7-6 (20)	CH
Eleva sandy loam:																	
Ogle County; 2,077 feet east and 9 feet south of the NW corner of sec. 5, T. 22 N., R. 10 E.	Residuum over sandstone bedrock.	1-1	0-3	119	11	99	98	92	39	37	18	18	5	18	*NP	A-4	SC
		1-4	13-21	120	12	97	96	90	32	31	26	19	17	24	10	A-4	SC
		1-6	28-35	110	11	94	93	91	6	5	5	4	3	---	NP	A-2-4	SP-SM
Varna silt loam:																	
Ogle County; 836 feet north and 362 feet west of the SE corner of sec. 4, T. 42 N., R. 2 E.	Glacial till.	1-1	0-9	104	19	100	100	99	91	85	60	36	31	34	14	A-6	CL
		1-5	24-32	107	18	100	99	96	81	78	69	48	39	46	27	A-7-6	CL
		1-6	32-40	124	12	96	95	88	77	67	59	29	23	28	13	A-6	CL

* NP means nonplastic.

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
Ashdale	Fine-silty, mixed, mesic Typic Argiudolls
*Assumption	Fine-silty, mixed, mesic Typic Argiudolls
Atkinson	Fine-loamy, mixed, mesic Typic Argiudolls
Atterberry	Fine-silty, mixed, mesic Udollic Ochraqualfs
Batavia	Fine-silty, mixed, mesic Mollic Hapludalfs
Birkbeck	Fine-silty, mixed, mesic Typic Hapludalfs
Boone	Mesic, uncoated Typic Quartzipsamments
Canisteo	Fine-loamy, mixed (calcareous), mesic Typic Haplaquolls
Catlin	Fine-silty, mixed, mesic Typic Argiudolls
*Chelsea	Mixed, mesic Alfic Udipsamments
*Comfrey	Fine-loamy, mixed, mesic Cumulic Haplaquolls
Dickinson	Coarse-loamy, mixed, mesic Typic Hapludolls
Dodge	Fine-silty, mixed, mesic Typic Hapludalfs
Downs	Fine-silty, mixed, mesic Mollic Hapludalfs
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Du Page	Fine-loamy, mixed, mesic Cumulic Hapludolls
Dubuque	Fine-silty, mixed, mesic Typic Hapludalfs
Dunbarton	Clayey, montmorillonitic, mesic Lithic Hapludalfs
Durand	Fine-loamy, mixed, mesic Typic Argiudolls
Elburn	Fine-silty, mixed, mesic Aquic Argiudolls
Elco	Fine-silty, mixed, mesic Typic Hapludalfs
Eleva	Coarse-loamy, mixed, mesic Typic Hapludalfs
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs
Flagg	Fine-silty, mixed, mesic Typic Hapludalfs
Flanagan	Fine, montmorillonitic, mesic Aquic Argiudolls
Fox	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Griswold	Fine-loamy, mixed, mesic Typic Argiudolls
Hitt Variant	Fine-loamy, mixed, mesic Typic Argiudolls
Houghton	Euic, mesic Typic Medisaprists
*Huntsville	Fine-silty, mixed, mesic Cumulic Hapludolls
Jasper	Fine-loamy, mixed, mesic Typic Argiudolls
Kendall	Fine-silty, mixed, mesic Aeric Ochraqualfs
Kidder	Fine-loamy, mixed, mesic Typic Hapludalfs
*La Hogue	Fine-loamy, mixed, mesic Aquic Argiudolls
Lamont	Coarse-loamy, mixed, mesic Typic Hapludalfs
La Rose	Fine-loamy, mixed, mesic Typic Argiudolls
*Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Martinsville	Fine-loamy, mixed, mesic Typic Hapludalfs
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
*Millbrook	Fine-silty, mixed, mesic Udollic Ochraqualfs
Millington	Fine-loamy, mixed (calcareous), mesic Cumulic Haplaquolls
*Muscatine	Fine-silty, mixed, mesic Aquic Hapludolls
Myrtle	Fine-silty, mixed, mesic Mollic Hapludalfs
Ockley	Fine-loamy, mixed, mesic Typic Hapludalfs
Odell	Fine-loamy, mixed, mesic Aquic Argiudolls
*Ogle	Fine-silty, mixed, mesic Typic Argiudolls
Orion	Coarse-silty, mixed, nonacid, mesic Aquic Udifluvents
Palsgrove	Fine-silty, mixed, mesic Typic Hapludalfs
Parr	Fine-loamy, mixed, mesic Typic Argiudolls
Pecatonica	Fine-loamy, mixed, mesic Typic Hapludalfs
Plano	Fine-silty, mixed, mesic Typic Argiudolls
Radford	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
*Ripon	Fine-silty, mixed, mesic Typic Argiudolls
Rockton	Fine-loamy, mixed, mesic Typic Argiudolls
*Rodman	Sandy-skeletal, mixed, mesic Typic Hapludolls
Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Rozetta	Fine-silty, mixed, mesic Typic Hapludalfs
Sable	Fine-silty, mixed, mesic Typic Haplaquolls
Sawmill	Fine-silty, mixed, mesic Cumulic Haplaquolls
Saybrook	Fine-silty, mixed, mesic Typic Argiudolls
Selma	Fine-loamy, mixed, mesic Typic Haplaquolls
Sidell	Fine-silty, mixed, mesic Typic Argiudolls
*Sogn	Loamy, mixed, mesic Lithic Haplustolls
Sparta	Sandy, mixed, mesic Entic Hapludolls
St.Charles	Fine-silty, mixed, mesic Typic Hapludalfs
Stronghurst	Fine-silty, mixed, mesic Aeric Ochraqualfs
Symerton	Fine-loamy, mixed, mesic Typic Argiudolls
Tama	Fine-silty, mixed, mesic Typic Argiudolls

TABLE 18.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Varna	Fine, illitic, mesic Typic Argiudolls
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Waukee	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludolls
Wea	Fine-loamy, mixed, mesic Typic Argiudolls
Westville	Fine-loamy, mixed, mesic Typic Hapludalfs
Whalan	Fine-loamy, mixed, mesic Typic Hapludalfs
*Winnebago	Fine-loamy, mixed, mesic Typic Argiudolls
Woodbine	Fine-loamy, mixed, mesic Typic Hapludalfs

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