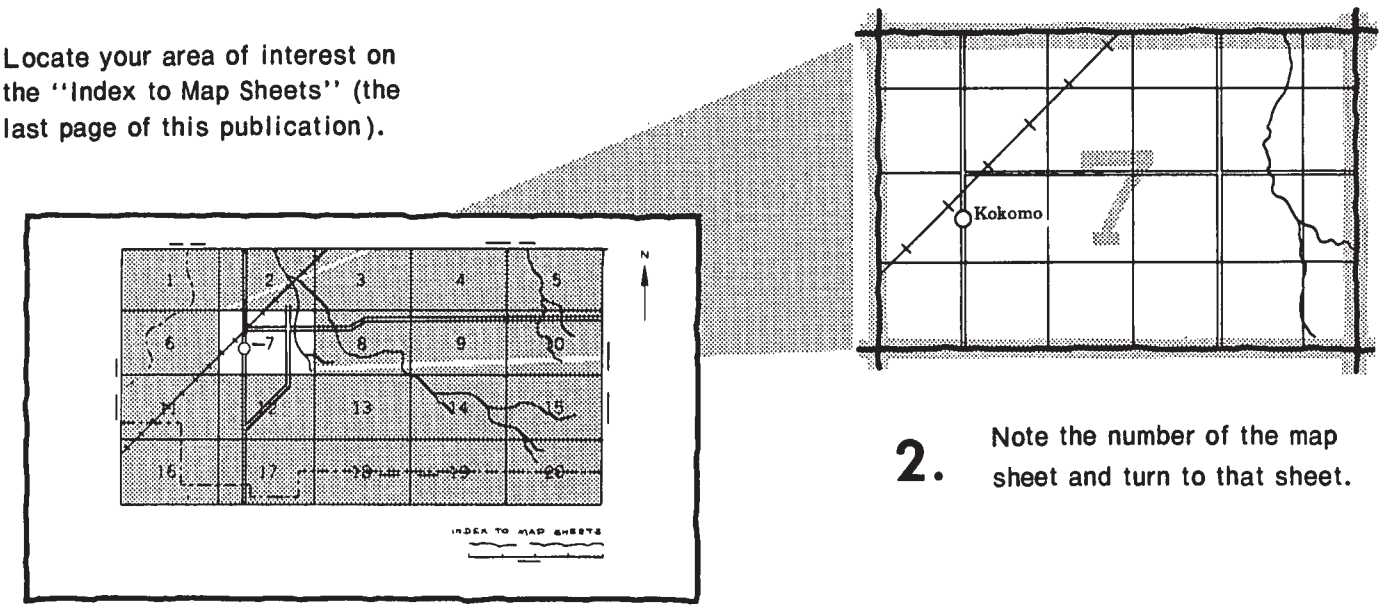
SOIL SURVEY OF

Grundy County, Illinois

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

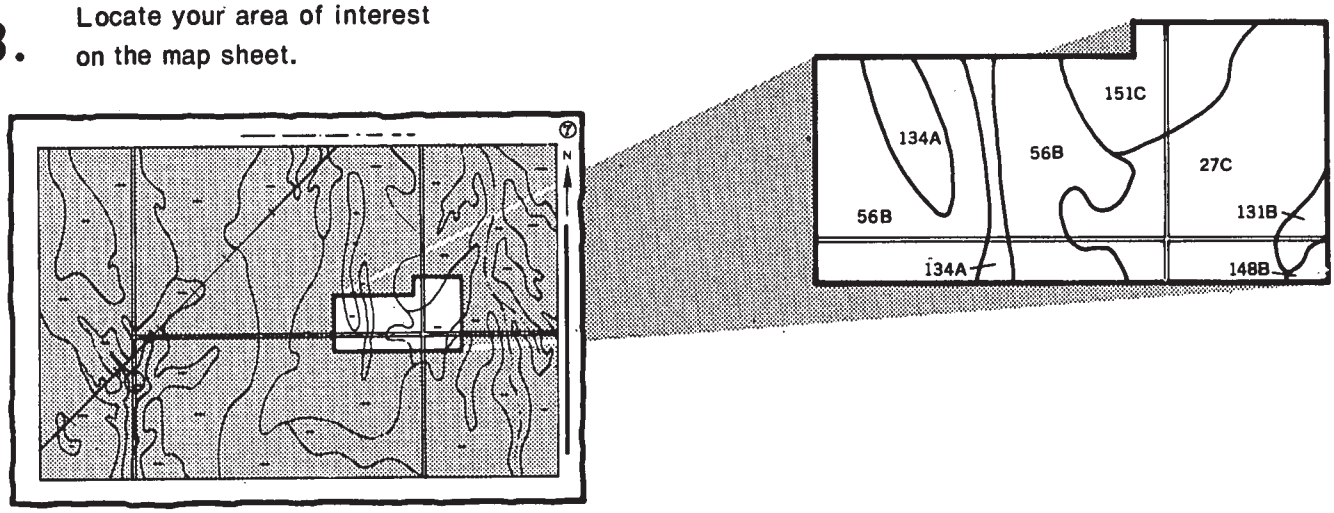
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

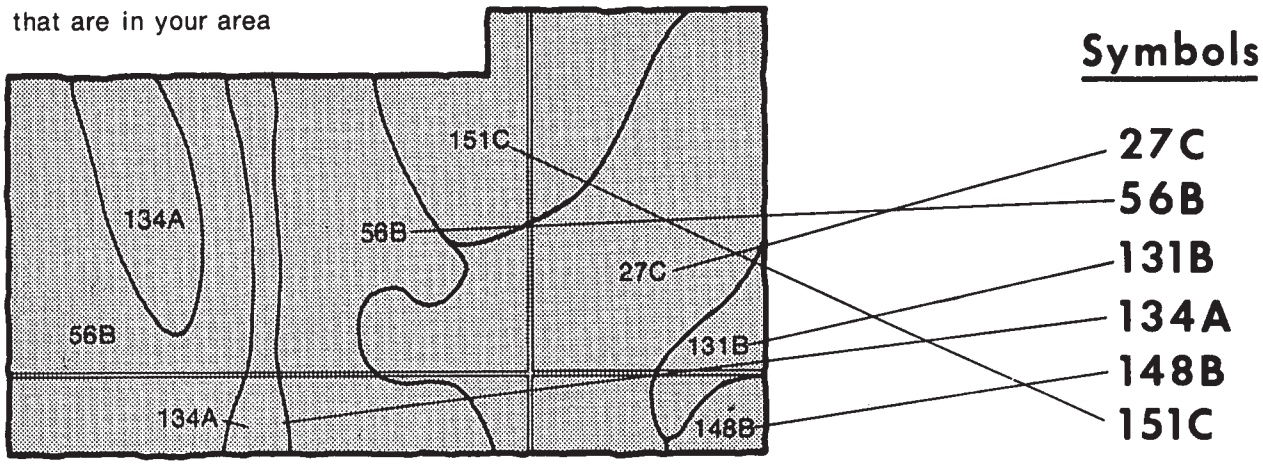


2. Note the number of the map sheet and turn to that sheet.

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

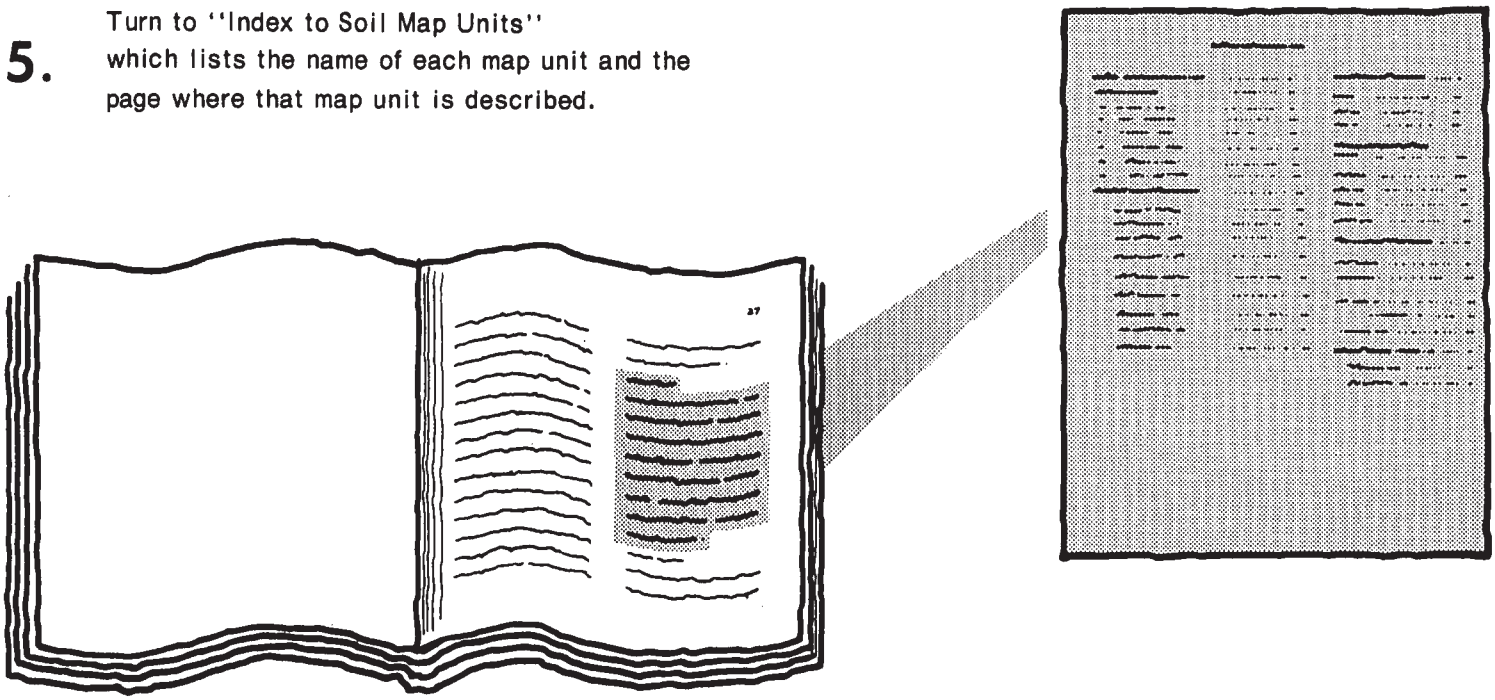


4. List the map unit symbols that are in your area

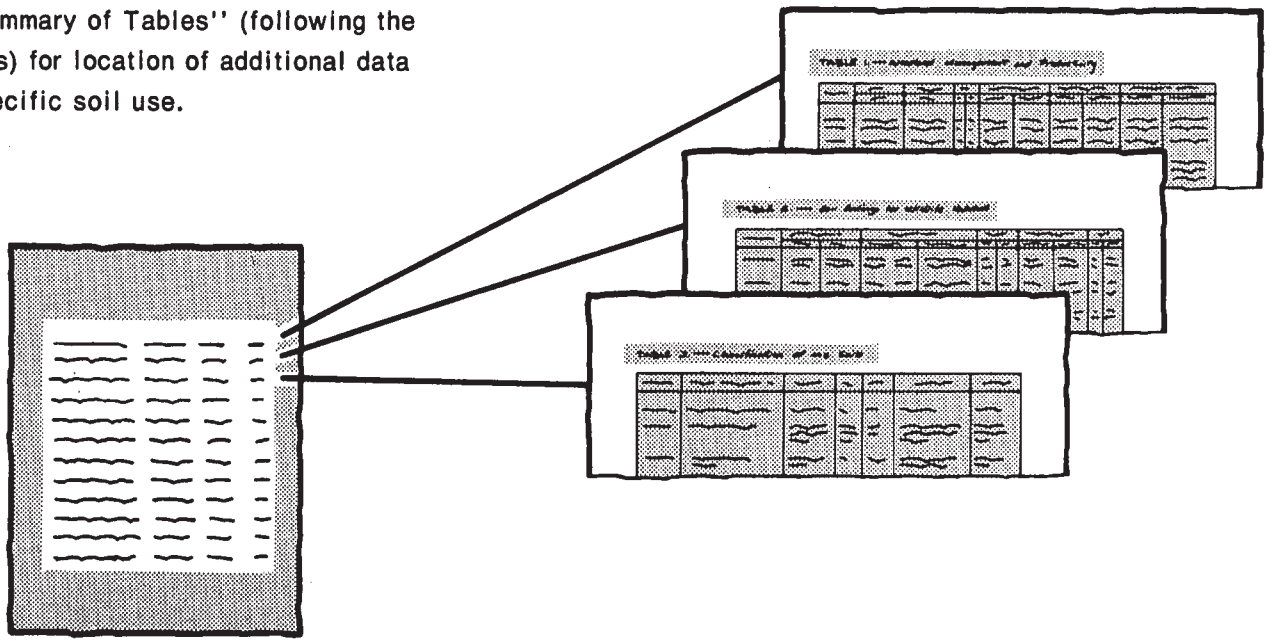


THIS SOIL SURVEY

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; for specialists in wildlife management, waste disposal, or pollution control.

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

Major fieldwork for this soil survey was performed in the period 1971-76. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Grundy County Soil and Water Conservation District. Financial assistance was provided by the Grundy County Board.

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

This soil survey is the Illinois Agricultural Experiment Station Soil Report No. 112.

Cover: Crop residue on Ridgeville fine sandy loam reduces soil blowing.

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Issued May 1980

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Foreword

This soil survey contains information that can be used in land-planning programs in Grundy County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

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

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

Warren J. Fitzgerald

Warren J. Fitzgerald
State Conservationist
Soil Conservation Service

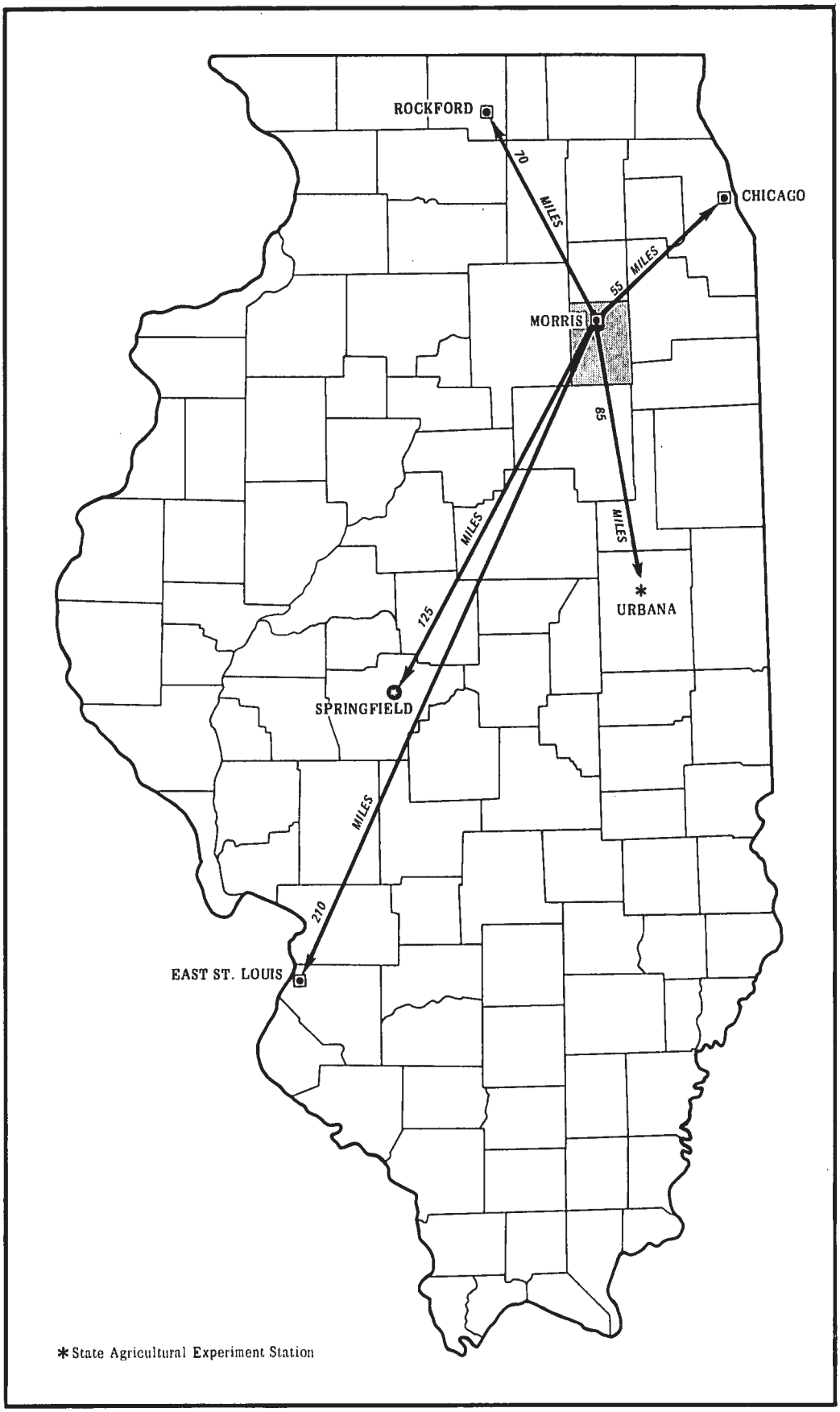

Figure 1 - Location of Grundy County in Illinois

SOIL SURVEY OF GRUNDY COUNTY, ILLINOIS

By L.M. Reineback, Soil Conservation Service

Fieldwork by L.M. Reineback, J.L. Alexander, B.E. Currie, C.E. Nelson, J.E. Paschke, D.L. Smith, and M.B. Walker, Soil Conservation Service

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

General nature of the survey area

GRUNDY COUNTY is in the northeastern part of Illinois, about 50 miles southwest of Chicago. It has a total area of 278,400 acres, or 432 square miles. Morris, the county seat, has a population of 8,400.

Climate

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

Grundy County is cold in winter. It is hot in summer with only occasional cool spells. Precipitation in winter frequently occurs as snowstorms. During warm periods it is chiefly showers, often heavy, when warm moist air moves in from the south. The total annual rainfall is generally adequate for corn, soybeans, and small grain.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Gebhard Woods Park 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 26 degrees F, and the average daily minimum temperature is 17 degrees. The lowest temperature on record, which occurred at Gebhard Woods Park on December 23, 1960, is -22 degrees. In summer the average temperature is 72 degrees, and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred at Gebhard Woods Park on July 10, 1966, is 102 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 30 inches. Of this, 21 inches, or 70 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 17 inches. The heaviest 1-day rainfall during the period of record was 3.9 inches at Gebhard Woods Park on May 18, 1965. Thunderstorms occur on about 40 days each year, and most occur in summer.

Average seasonal snowfall is 22 inches. The greatest snow depth at any one time during the period of record was 14 inches. On an average of 21 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 40 percent in winter. The prevailing wind is from the west. Average windspeed is highest, 11 miles per hour, in spring.

Relief, physiography, and drainage

The highest point in the county is near Minooka in the extreme northeastern part where the elevation is 615 feet above sea level. The lowest point is along the Illinois River on the west side where the elevation is about 490 feet.

Nearly the entire area drains into the Illinois River, which crosses the northern half of the county. The Illinois River begins near the eastern edge of Grundy County at the junction of the Des Plaines River from the northeast and the Kankakee River from the southeast. The drainage system is immature. The main tributary, which drains the southern part of the county, is the Mazon River. Three main creeks drain directly into the Illinois River—the Nettle and Aux Sable Creeks from the north and the Waupecon Creek from the south.

About two-thirds of Grundy County is dark colored, nearly level soils of the uplands. About one-ninth is dark colored, gently sloping soils of the uplands. Small areas of hilly and steep soils occur near the Illinois River. Very

sandy soils occur in the east-central part of the county and also along the Illinois River. These areas are susceptible to soil blowing, droughtiness, and wetness. A narrow area along the river bottoms is subject to flooding.

Farming and industry

Farming is the main enterprise in Grundy County. Farms average about 310 acres. About 75 percent of the county is cropland. About 50 percent of the cropland is used for corn, and about 40 percent for soybeans. The rest is used for hay, grass silage, and wheat. About 2.5 percent of the county has been strip mined. About 1 percent is covered with industrial plants.

Seventeen percent of the farms have beef cattle, 9 percent hogs, 4 percent dairy cattle, 4 percent sheep, 6 percent horses and ponies, and 5 percent chickens.

Important industries include the manufacture of chemicals, explosives, clay products, and electrical power and the processing of sand and gravel.

Highways, railways, and river barges provide transportation. Interstate 80 crosses the county north of the Illinois River. The Illinois River provides barge transportation for agricultural and many other products.

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.

Land use considerations

Production of corn and soybeans is the chief land use in Grundy County. Some soils are better suited to this use than others. Soil management problems differ in kind, degree, and extent among the various soil associations. The methods of overcoming the soil-related problems and the response to management vary from one

association to another. The general soil map helps in locating general areas where particular kinds of soil management problems occur. Drainage, erosion, soil blowing, flooding, and shallowness over bedrock are the main management problems in the county.

Descriptions of map units

Dominantly soils that formed on uplands in medium textured material over moderately fine and fine textured glacial till

These soils are nearly level, gently sloping, and moderately steep to very steep. The most extensive management problem is soil drainage. On some of the soils, erosion is a problem.

1. Elliott-Ashkum-Drummer association

Deep, moderately slowly permeable and moderately permeable, nearly level and gently sloping, somwhat poorly drained and poorly drained soils

This association (fig. 1) makes up about 28 percent of the county. It is about 34 percent Elliot soils, 26 percent Ashkum soils, 10 percent Drummer soils, and 30 percent soils of minor extent.

The nearly level Elliott soils are on ridges at slightly higher elevations than Ashkum and Drummer soils. They are somewhat poorly drained. Ashkum and Drummer soils are in broad depressional areas. They are poorly drained. All have a black surface layer more than 10 inches thick. In Elliott soils this layer is silt loam. In Ashkum and Drummer soils it is silty clay loam that is sticky when wet.

Minor in this association are the moderately well drained Varne soils and well drained Proctor soils on ridges and side slopes, the somewhat poorly drained Martinton soils in level areas, and the very poorly drained Peotone soils and poorly drained Sawmill soils in drainageways.

This association is used mainly for corn and soybeans. Most of it has been drained, but improved drainage is needed. Wetness is the main limitation for farming and for most other uses. Small ponded areas are common early in spring.

If adequately drained, this association has good potential for cultivated crops. Wetness, a severe limitation, is so difficult to overcome that the potential is poor for dwellings and sanitary facilities.

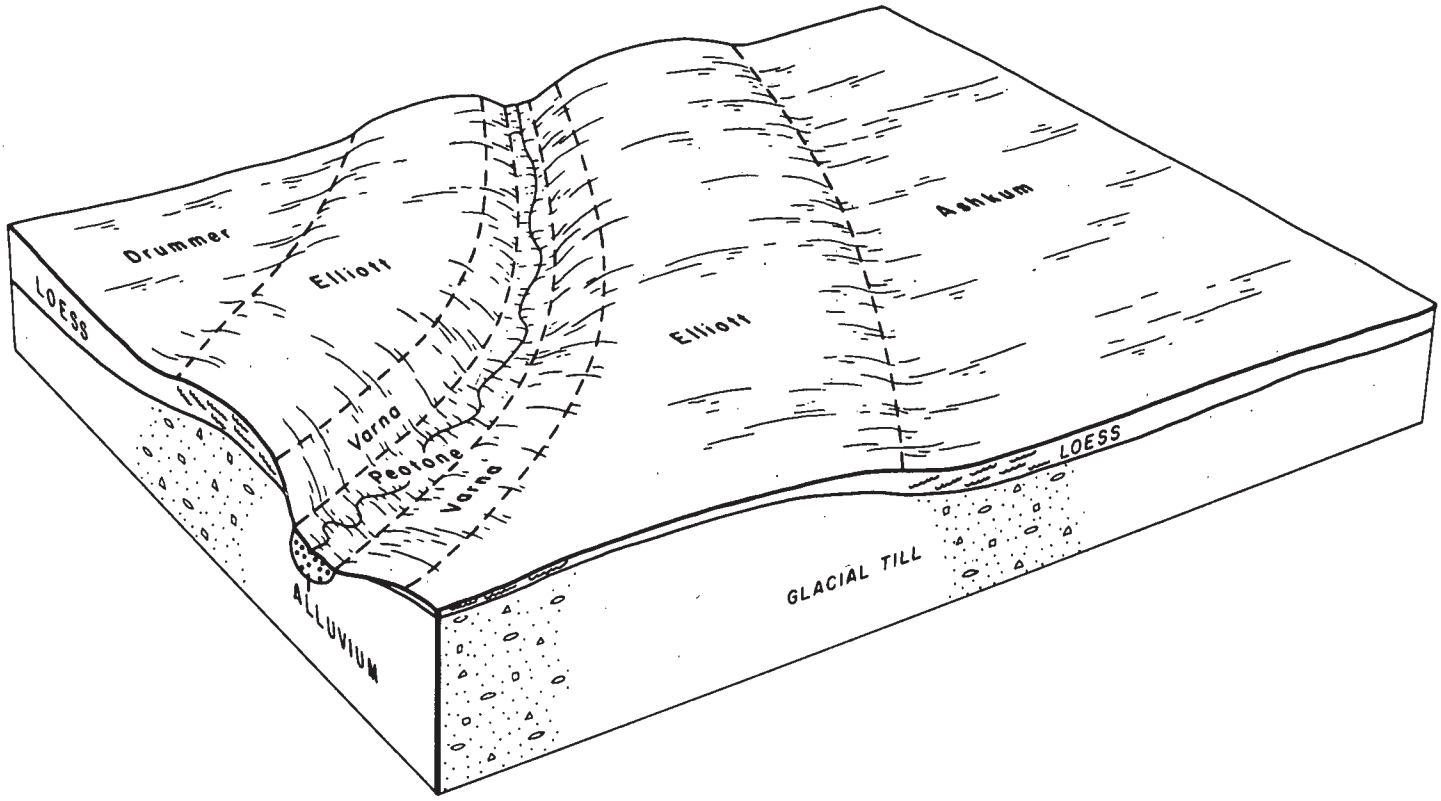

Figure 1.—Pattern of soils and parent material in Elliot-Ashkum-Drummer unit.

2. Chatsworth-Blount association

Deep, very slowly permeable to moderately slowly permeable, nearly level to very steep, moderately well drained and somewhat poorly drained soils

This association (fig. 2) makes up about 3 percent of the county. It is about 33 percent Chatsworth soils, 29 percent Blount soils, and 38 percent soils of minor extent.

Chatsworth soils are moderately steep to very steep and moderately well drained. Blount soils are nearly level and gently sloping and somewhat poorly drained. Blount soils are on ridges above areas of Chatsworth soils. Both have a dark grayish brown, grayish brown, or brown silt loam surface layer.

Minor in this association are the moderately well drained Morley soils and somewhat poorly drained Nappanee soils on ridges and the well drained Ross soils along creek bottoms.

This association is used mainly for timber, pasture, or corn and soybeans. Much of the acreage is too steep for farming. The areas that can be farmed are irregularly shaped fields subject to erosion. Timbered areas are often pastured. Wetness and steep slopes are severe limitations for recreation and residential uses.

3. Reddick-Andres association

Deep, moderately slowly permeable and slowly permeable, nearly level, poorly drained and somewhat poorly drained soils

This association (fig. 3) makes up about 15 percent of the county. It is about 65 percent Reddick soils, 22 percent Andres soils, and 13 percent soils of minor extent.

Reddick soils are in broad depressions and are poorly drained. Andres soils are in nearly level areas at slightly higher elevations where surface drainage is better. They are somewhat poorly drained. Both have a black surface layer more than 10 inches thick. In Reddick soils this layer is silty clay loam that is sticky when wet, and in Andres soils it is silt loam. Both soils have a silty clay loam, clay loam, or sandy loam subsoil.

Minor in this association are the poorly drained Ashkum soils in depressions, the somewhat poorly drained Lawson soils along drainageways, and the moderately well drained Symerton soils on ridges and side slopes.

This association is used almost entirely for corn and soybeans. Wetness is the main limitation for farming and for most other uses. Small ponded areas are common early in spring.

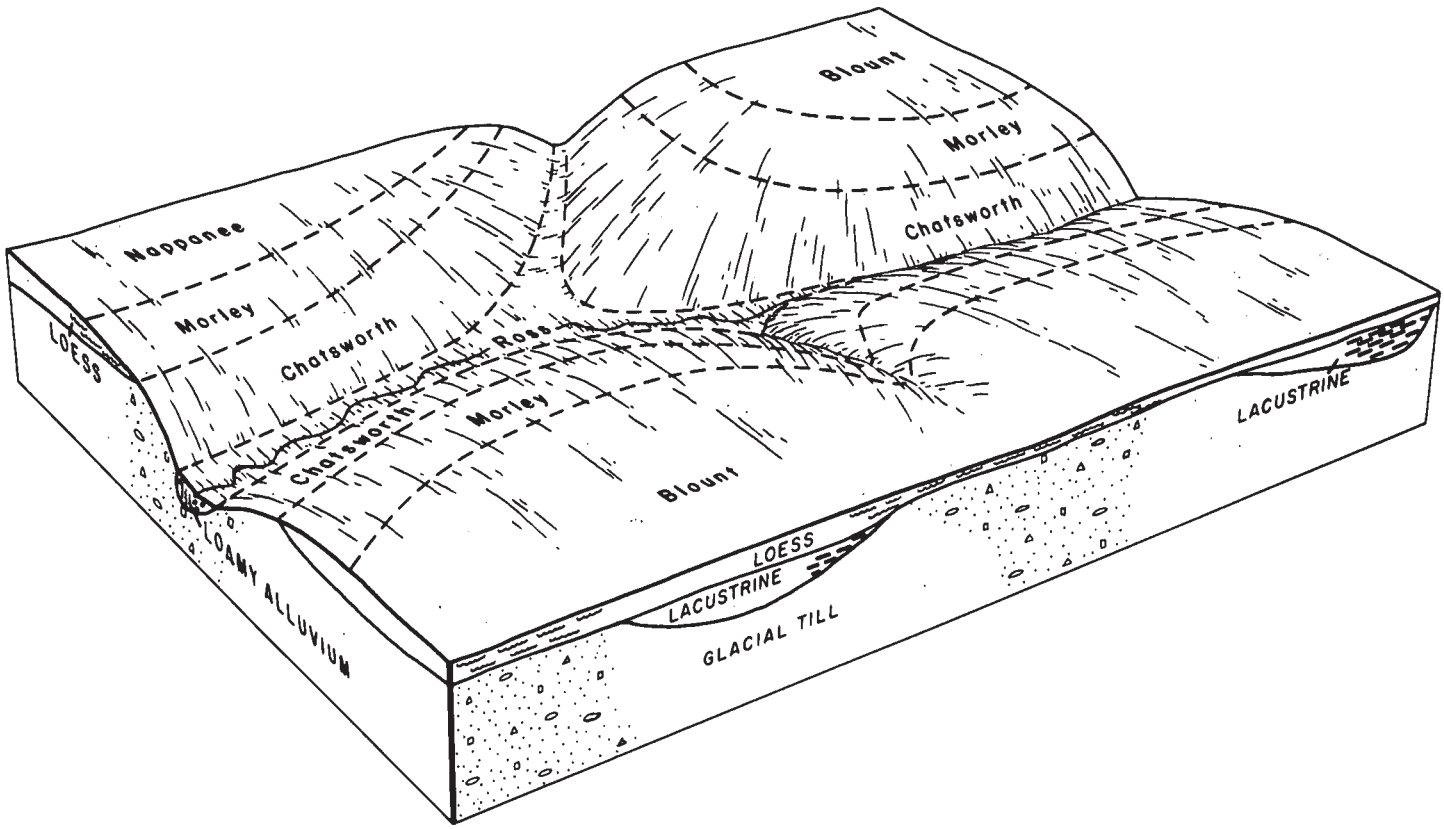

Figure 2.—Pattern of soils and parent material in Chatsworth-Blount unit.

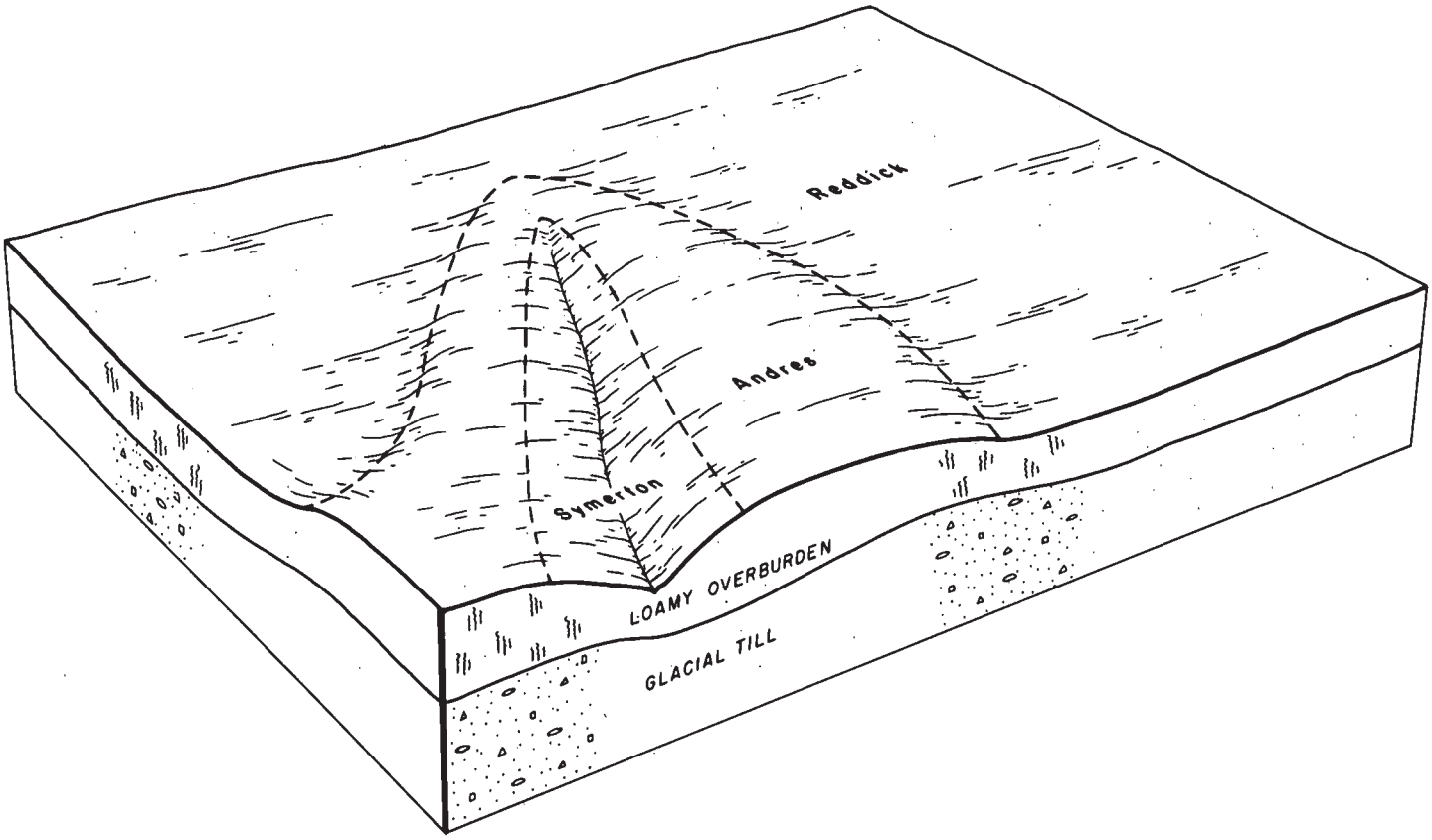

Figure 3.—Pattern of soils and parent material in Reddick-Andres unit.

If adequately drained, this association has good potential for cultivated crops. Wetness is a severe limitation for residential uses.

Dominantly soils that formed on uplands in medium textured and moderately fine textured material over stratified moderately coarse and coarse textured glacial outwash

These soils are nearly level. The most extensive management problem is soil drainage.

4. Drummer-Selma-Brenton association

Deep, moderately permeable, nearly level, poorly drained and somewhat poorly drained soils

This association makes up about 20 percent of the county. It is about 39 percent Drummer soils (fig. 4), 20 percent Selma soils, 18 percent Brenton soils, and 23 percent soils of minor extent.

Drummer and Selma soils are in broad depressions and are poorly drained. The nearly level Brenton soils are at slightly higher elevations where surface drainage is better. They are somewhat poorly drained. All have a black surface layer more than 10 inches thick. In Drummer soils this layer is silty clay loam that is sticky when wet. In Selma soils it is loam, and in Brenton soils it is silt loam.

Minor in this association are the well drained Proctor and Jasper soils on ridges and side slopes, the somewhat poorly drained Starks and Darroch soils in level areas, and the poorly drained Sawmill and Comfrey soils along creek bottoms.

This association is used mostly for corn and soybeans. Wetness is the main limitation for farming and for most other uses. Small ponded areas are common early in spring.

If adequately drained, this association has good potential for cultivated crops. Wetness is a severe limitation for residential uses.

Dominantly soils that formed on terraces and uplands in coarse textured and moderately coarse textured glacial outwash

These soils are dominantly nearly level to sloping. Some strongly sloping soils on ridges are included. The most extensive management problem is soil drainage, but soil blowing and droughtiness are also problems.

Figure 4.—Drummer soils in dark area in center. Proctor soils are on the ridge. Brenton soils are in the lighter area in foreground.

5. Hononegah-Warsaw-Selma association

Deep, very rapidly permeable and moderately permeable, nearly level to sloping, excessively drained, well drained, and poorly drained soils on terraces

This association makes up about 2 percent of the county. It is about 45 percent Hononegah soils, 16 percent Warsaw soils, 14 percent Selma soils, and 25 percent soils of minor extent.

Hononegah and Warsaw soils are on the higher ridges, and Selma soils are in low depressions. Hononegah soils are excessively drained, Warsaw soils are well drained, and Selma soils are poorly drained. All have a black surface layer more than 10 inches thick. In Hononegah soils this layer is loamy sand, in Warsaw soils it is loam, and in Selma soils it is loam or clay loam.

Minor in this association are the excessively drained Sparta soils and somewhat excessively drained Ade soils on ridges, the somewhat poorly drained Kane soils in level areas, and the wet Aquolls in low depressions.

This association is used for pasture, corn, or soybeans. Some areas are under urban development. Some

are idle. Some are used as a source of sand and gravel. In most areas, droughtiness is the main limitation for farming. Only Selma soils have adequate moisture holding capacity. Seepage is a problem in using the Hononegah and Warsaw soils for sanitary facilities. Selma soils are too wet for sanitary facilities.

This association has poor to good potential for cultivated crops. Many areas are subject to soil blowing.

6. Watseka-Sparta-Maumee association

Deep, rapidly permeable, nearly level and gently sloping, excessively drained, somewhat poorly drained, and poorly drained soils on uplands

This association (fig. 5) makes up about 2 percent of the county. It is about 37 percent Watseka soils, 34 percent Sparta soils, 20 percent Maumee soils, and 9 percent soils of minor extent.

Watseka soils are nearly level. Sparta soils are on ridges in areas that are somewhat higher than the surrounding areas of Watseka and Maumee soils. Maumee soils are slightly depressional. Sparta soils are excessively drained, Watseka soils are somewhat poorly drained, and Maumee soils are poorly drained. All have a surface layer of black or very dark brown loamy fine sand more than 10 inches thick.

Minor in this association are the somewhat excessively drained Ade soils and somewhat poorly drained Ridgeville soils on ridges.

This association is used mainly for corn and soybeans. Soil blowing and droughtiness are the main limitations for farming. In the poorly drained areas, drainage is needed for optimum yields.

This association has poor to fair potential for cultivated crops. In most areas wetness is a severe limitation for residential uses, but many ridges are suitable building sites. Wetness is a problem for septic tank absorption fields. The excessively drained areas in the association are well suited to septic tank absorption fields, but there is a possible hazard of ground water contamination because of the sandy subsoil.

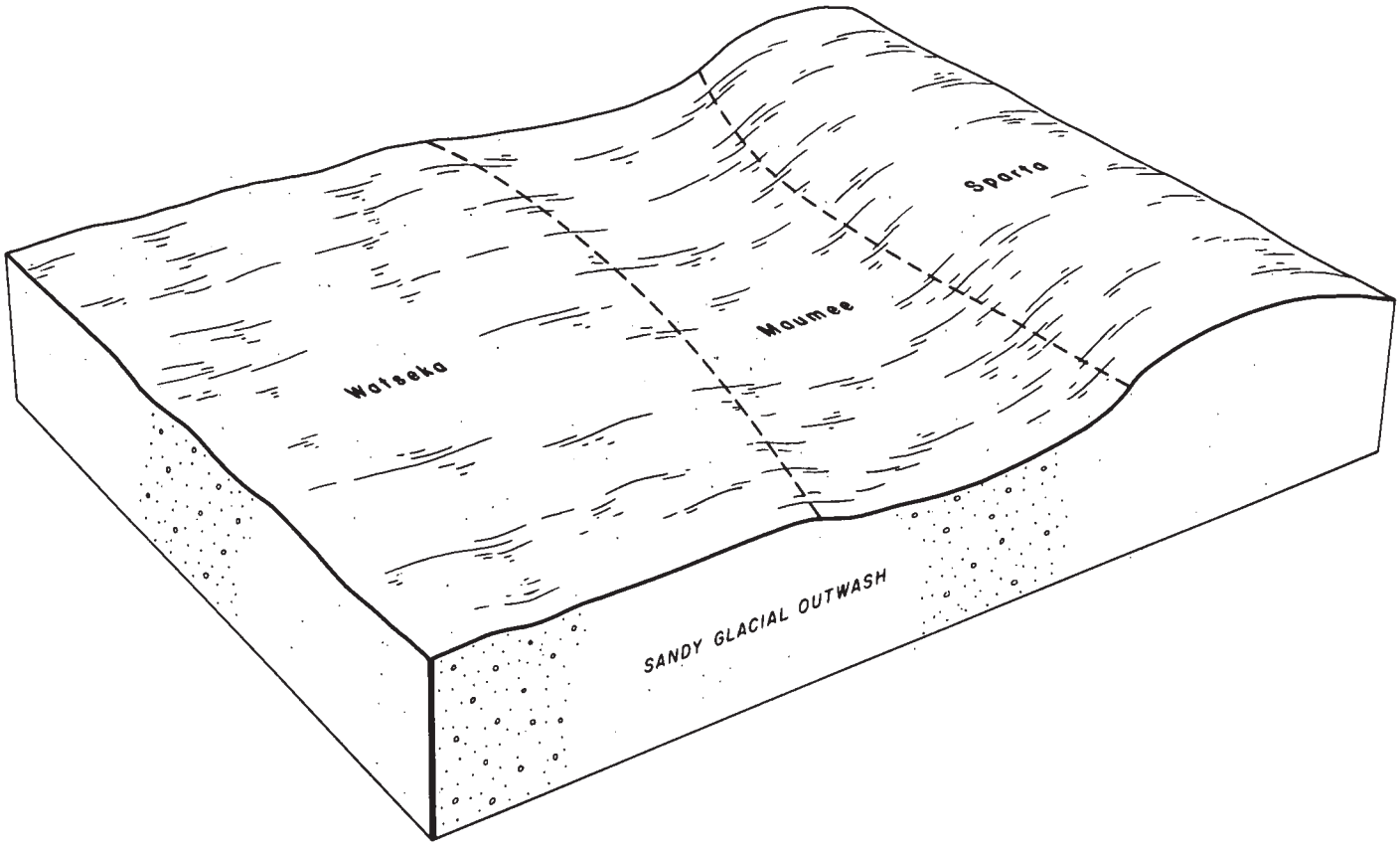

Figure 5.—Pattern of soils and parent material in Watseka-Sparta-Maumee unit.

7. Ridgeville-Ade-Gilford association

Deep, rapidly permeable to moderately permeable, nearly level and gently sloping, somewhat excessively drained, somewhat poorly drained, and poorly drained soils on uplands

This association (fig. 6) makes up about 8 percent of the county. It is about 25 percent Ridgeville soils, 22 percent Ade soils, 18 percent Gilford soils, and 35 percent soils of minor extent.

Ridgeville soils are level and somewhat poorly drained. Ade soils are gently sloping, excessively drained, and droughty. They are on ridges at somewhat higher elevations than Gilford and Ridgeville soils. Gilford soils are slightly depressional and are poorly drained. All three soils have a very dark grayish brown or black surface layer more than 10 inches thick. In Ade soils this layer is loamy sand, and in Gilford and Ridgeville soils it is sandy loam.

Minor in this association are the poorly drained Selma soils in depressions, the somewhat poorly drained Roby soils in level areas near streams, and the excessively drained Sparta soils on gently sloping ridges.

This association is used mainly for cultivated crops. Soil blowing is the main limitation for farming. The somewhat excessively drained parts of the association are droughty. In the poorly drained areas drainage is needed.

This association has fair to good potential for cultivated crops. Wetness is the limitation that affects the potential for residential uses. The somewhat excessively drained parts of the association are well suited to residential uses.

Dominantly soils that formed on uplands in moderately fine and fine textured lakebed sediments or glacial till

These soils are nearly level and gently sloping and are along drainageways. The most extensive management problem is soil drainage.

8. Swygert-Martinton-Milford association

Deep, slowly permeable and moderately slowly permeable, nearly level and gently sloping, somewhat poorly drained and poorly drained soils

This association (fig. 7) makes up about 8 percent of the county. It is about 27 percent Swygert soils, 23

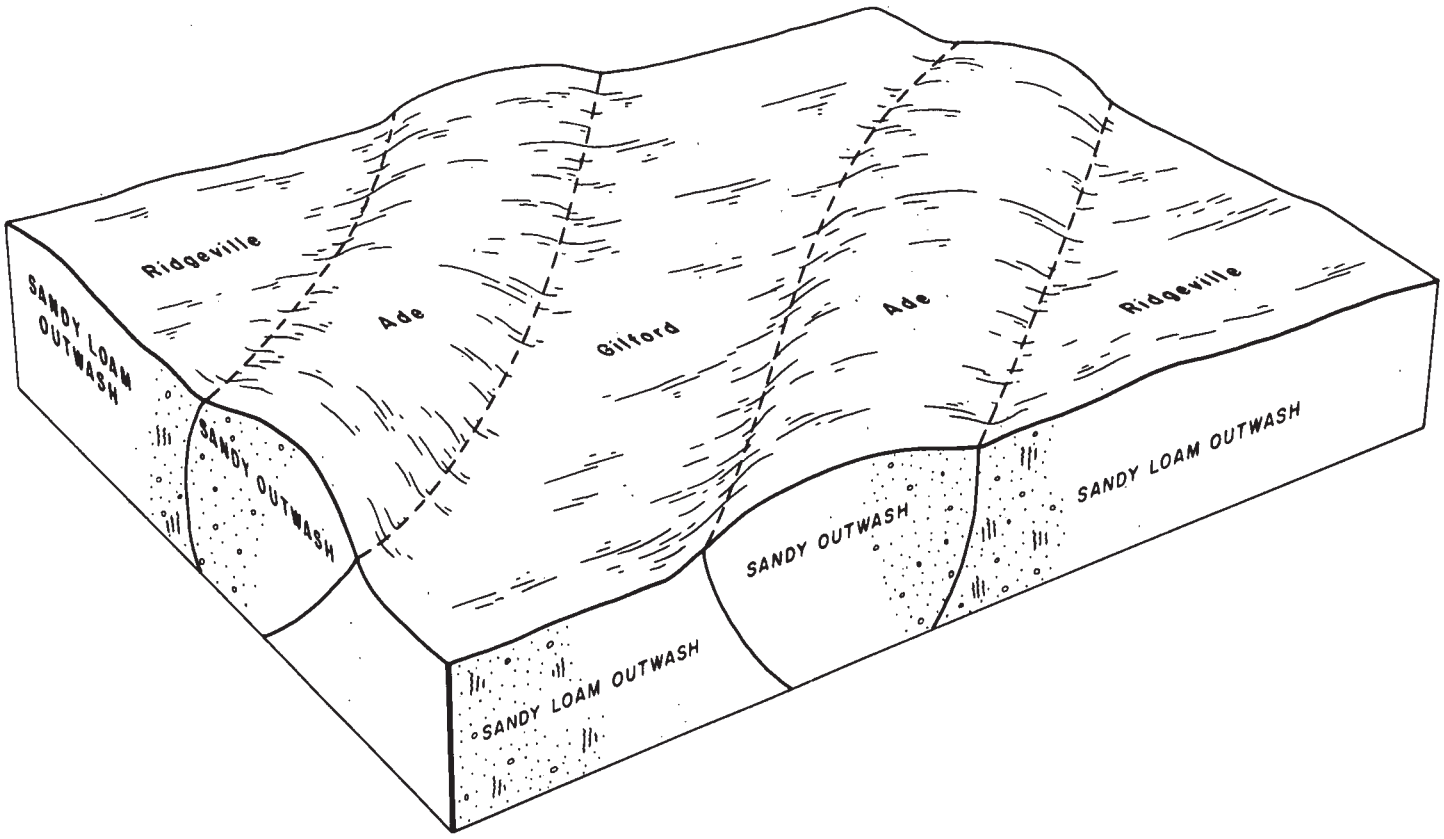

Figure 6.—Pattern of soils and parent material in Ridgeville-Ade-Gilford unit.

percent Martinton soils, 22 percent Milford soils, and 28 percent soils of minor extent.

The somewhat poorly drained Swygert and Martinton soils are slightly higher in elevation than Milford soils, or they are on gentle slopes near drainageways. The poorly drained Milford soils are slightly depressional. All of these soils have a black surface layer more than 10 inches thick. In Martinton soil this layer is silt loam, and in Milford and Swygert soils it is silty clay loam.

Minor in this association are the poorly drained Bryce soils in broad, slightly depressional areas, the poorly drained and somewhat poorly drained Sawmill and Lawson soils in drainageways, and the somewhat poorly drained Nappanee soils in level areas near the main streams.

This association is used mainly for corn and soybeans. Some of it has been drained, but in places tile drainage is not effective. Wetness and slow permeability are the main limitations for farming and for most other uses. Ponded areas are common early in spring.

This association has fair to good potential for cultivated crops. Wetness and poor tilth are the main problems for farming. Draining these soils adequately is difficult. Wetness severely limits the use of the soils for residences.

Dominantly moderately deep soils that formed on terraces in thin deposits of coarse textured and fine textured material over shale, sandstone, or limestone

These soils are nearly level and gently sloping. The most extensive management problem is soil drainage. Some areas are stony.

9. Bryce-Shadeland-High Gap association

Moderately deep, slowly permeable to moderately permeable, nearly level and gently sloping, poorly drained to moderately well drained soils

This association makes up about 7 percent of the county. It is about 23 percent Bryce soils, 22 percent Shadeland soils, 8 percent High Gap soils, and 47 percent soils of minor extent.

Bryce soils are in slightly depressional areas or in drainageways. Shadeland soils are in level areas at somewhat higher elevations than Bryce soils. High Gap

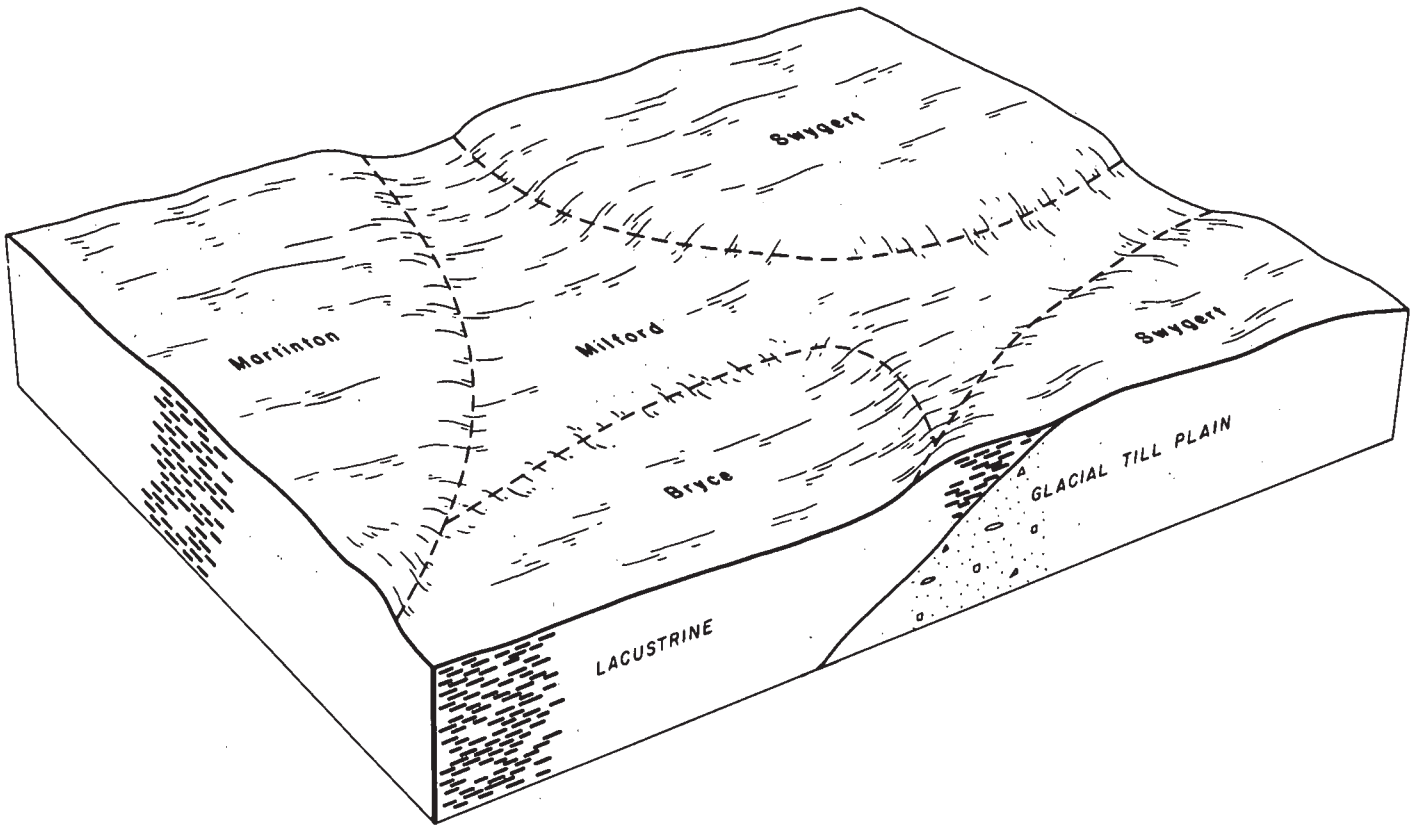

Figure 7.—Pattern of soils and parent material in Swygert-Martinton-Milford unit.

soils are on ridges. Most of these soils have a black or very dark grayish brown surface layer. In Bryce soils this layer is silty clay loam or silty clay, in Shadeland soils it is silt loam, and in High Gap soils it is loam. Depth to sandstone or shale bedrock, or both, is dominantly 20 to 50 inches.

Minor in this association are the poorly drained Calamine Variant soils, the well drained Channahon and Rockton soils, the somewhat poorly drained Martinton soils, the poorly drained Milford and Faxon soils, and the wet Aquolls. Calamine Variant soils occur with Bryce soils on the landscape. Channahon and Rockton soils are on somewhat higher ridges, Martinton soils are in level areas, Milford and Faxon soils are in low depressions, and Aquolls are in low swampy areas.

Some of this association is used for cultivated crops. Some is used for hay and pasture. Some is idle. Some is under urban development. Wetness and depth to bedrock are the main limitations for farming and for most other uses.

This association has poor potential for cultivated crops. Wetness often delays planting. The bedrock interferes with drainage. Some areas are droughty or too stony. Wetness or the depth of bedrock, or both, severely limit the use of these soils for residences.

Dominantly soils that formed on flood plains in moderately fine textured and medium textured sediment

These soils are nearly level. The main management problems are flooding and drainage.

10. Sawmill-Lawson-Ross association

Deep, moderately permeable and moderately slowly permeable, nearly level, poorly drained, somewhat poorly drained, and well drained soils

This association (fig. 8) makes up about 4 percent of the county. It is about 36 percent Sawmill soils, 24 percent Lawson soils, 11 percent Ross soils, 28 percent water, and 1 percent soils of very minor extent.

Sawmill soils are slightly lower in elevation than Lawson and Ross soils, and they are poorly drained. Lawson soils are somewhat poorly drained, and Ross soils are well drained. All have a very dark grayish brown, very dark gray, or black surface layer more than

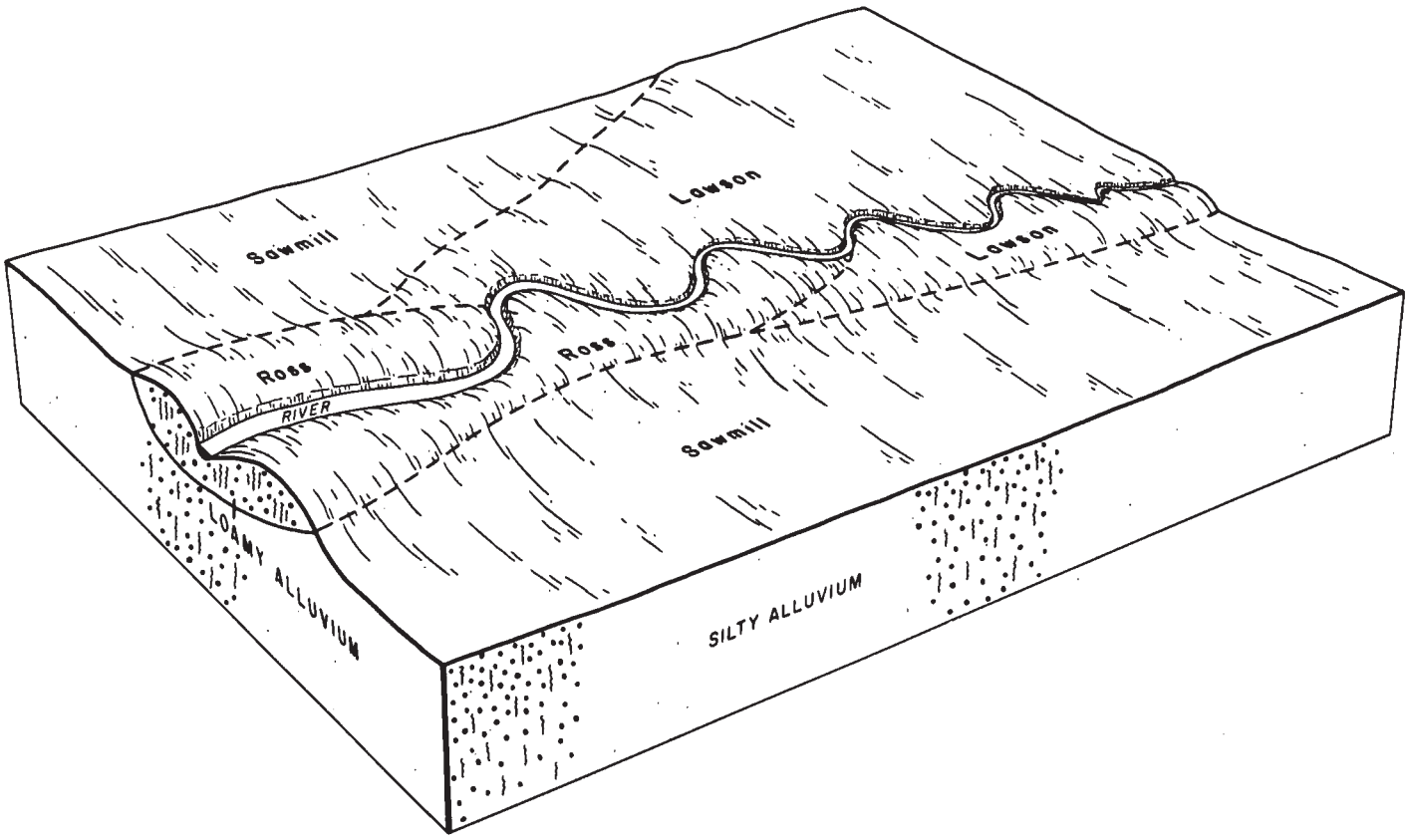

Figure 8.—Pattern of soils and parent material in Sawmill-Lawson-Ross unit.

22 inches thick. In Sawmill soils this layer is silty clay loam that is sticky when wet. In Lawson and Ross soils it is silt loam. All are subject to flooding, but the floodwater recedes faster from Lawson and Ross soils than from Sawmill soils. Sawmill soils tend to remain ponded.

This association is used mainly for corn. In some areas when the water table is at or near the surface most of the year, the association is idle or supports only trees and brush. Wetness and flooding are the main limitations for farming and for most other uses.

This association has fair to good potential for cultivated crops. Flooding, however, occurs nearly every year and sometimes damages crops. It severely limits the use of these soils for residences.

Dominantly strip mined soils that formed in loamy material

These are rolling and very steep soils—dominantly mounds of spoil left as ridges. Included are many enclosed bodies of water of varying size. Some areas have been partially leveled.

11. Orthents association

Deep, moderately permeable and slowly permeable, rolling and very steep loamy soils on uplands

This association (fig. 9) makes up about 3 percent of the county. It is about 80 percent Orthents and 20 percent water, dominantly lakes.

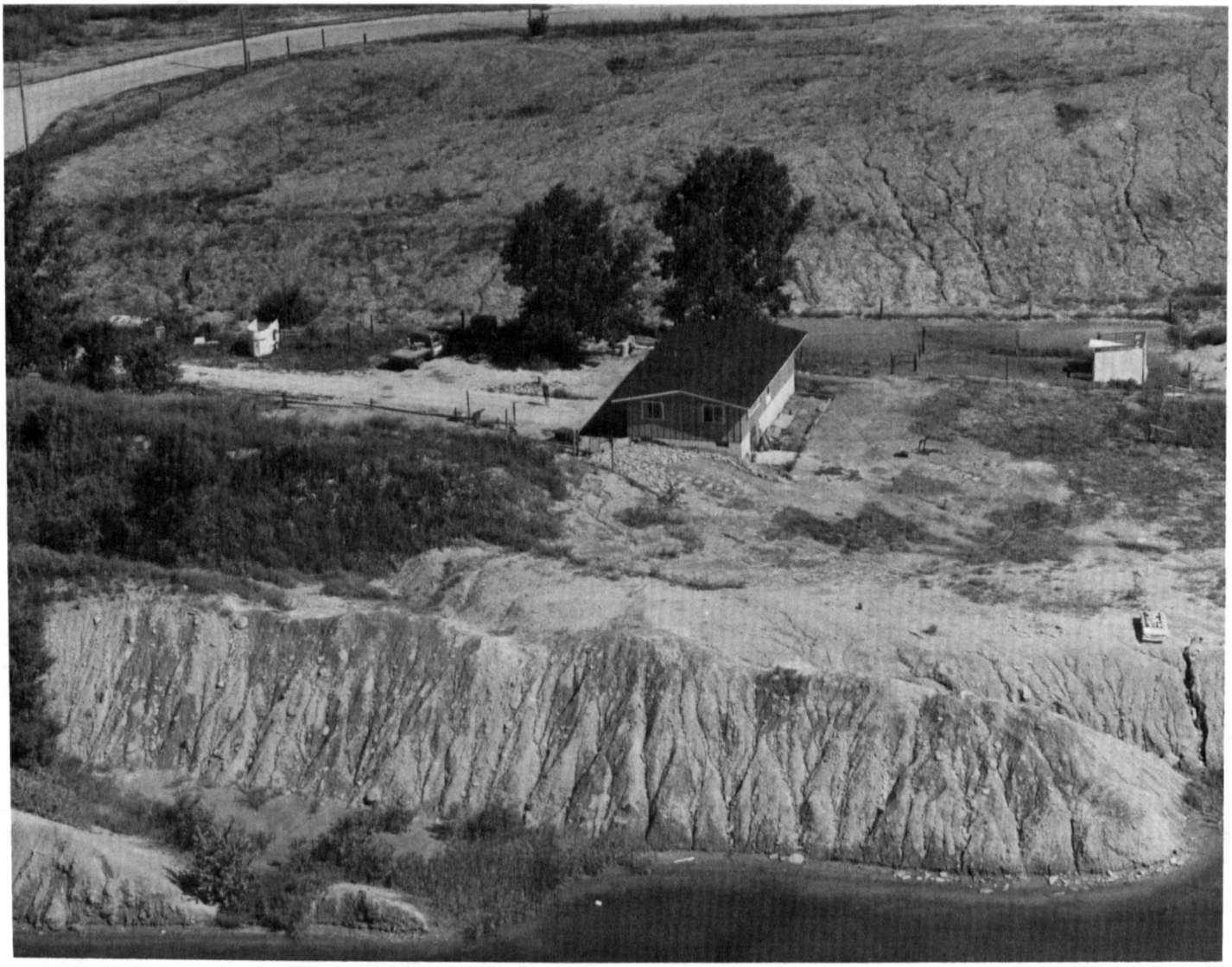

Figure 9.—Orthents, loamy soils. About 14 percent of the acreage has been partially leveled, as shown in the background. These soils are mixed spoil left by strip mining.

Orthents are rough, parallel ridges left by strip mining. The material in these ridges is either moderately alkaline and sandy or extremely acid silty shale, depending on the depth of the dig. In places, Orthents have been partially leveled. They are dominantly dark gray and dark grayish brown, mottled loamy material containing many stones and a few boulders. The material is predominantly calcareous.

This association is used to some extent for recreation and housing, but most of it is idle. Steepness, roughness, and low fertility are the main limitations for farming and for most other uses.

This association has poor potential for cultivated crops or pasture. Leveling, stone removal, and fertilization are essential for cultivation. The potential is poor for residences because of the slope.

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, Varna silt loam, 2 to 5 percent slopes, is one of two phases in the Varna series.

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

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. Bryce-Calamine Variant complex is an example.

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.

Not all units in this survey area have been mapped with the same degree of detail. Broadly defined units are likely to be larger and to vary more in composition than units mapped in greater detail. Composition has been controlled well enough, however, for the expected use of the soils.

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

23B—Blount silt loam, 1 to 4 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is on low upland ridges and gentle side slopes. Areas are irregularly shaped and range from 3 to 25 acres.

Typically the surface layer is dark grayish brown and brown silt loam about 8 inches thick. The subsoil is about 24 inches thick. The upper part is brown, mottled silty clay loam. The middle part is grayish brown, mottled silty clay. The lower part is grayish brown, mottled silty clay loam. The underlying material to a depth of about 60 inches is brown silty clay loam. In some areas the surface layer is silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Ashkum soils in depressions and drainageways and the moderately well drained Morley soils on somewhat higher ridges. Included soils make up less than 10 percent of any one mapped area.

Air and water movement is moderately slow to slow through this soil. Runoff is medium to slow. The available water capacity is moderate. The organic-matter content is moderate. The shrink swell is moderate. The surface layer tends to pack and become dense if overtilled or subjected to heavy rain. Compaction reduces air and water movement. The water table is often within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The soil has fair potential for cultivated crops, hay, pasture, and trees. It has poor potential for dwellings and septic tank absorption fields.

This soil is suited to corn, soybeans, small grain, grasses, and legumes. It is easily eroded if cultivated. Keeping tillage at a minimum, terracing, contour farming, and managing crop residue reduce the risk of erosion.

Returning crop residue also reduces the risk of compaction and increases water infiltration. Overgrazing pasture is to be avoided.

Wetness and moderately slow to slow permeability are the main limitations in using this soil as a site for dwellings and septic systems. For dwellings, the water table should be lowered. For septic systems, a larger absorption field is needed.

The capability subclass is IIe.

42—Papineau sandy loam. This nearly level, somewhat poorly drained soil is on lakebed plains in the upland. Individual areas are long or irregularly shaped and range from 2 to 60 acres.

Typically, the surface layer is black and very dark gray sandy loam about 13 inches thick. The subsoil is about 28 inches thick. The upper and middle parts are dark grayish brown and grayish brown, mottled sandy clay loam. The lower part is very firm, gray and light olive brown, mottled clay. The underlying material to a depth of about 60 inches is very firm, gray and light olive brown clay. In some places depth to the underlying clayey material is less than 20 inches. In other places it is more than 40 inches. In some areas there is more sand in the upper and middle parts of the subsoil than is typical.

Less than 10 percent of any one mapped area is small included areas of the poorly drained Bryce and Selma soils in depressions.

Water and air move at a moderate rate through the upper and middle parts of this soil but at a slow rate through the lower part. Runoff is slow. The available water capacity is moderate. The organic-matter content is moderate. The surface layer is easily tilled. The water table is often within a depth of 3 feet in winter and spring.

Most areas are farmed. Some are urban areas. The potential is fair for cultivated crops and hay or pasture and poor for trees. It is poor for dwellings and septic tank absorption fields.

This soil is only fairly well suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Drainage is needed. The soil is difficult to drain because of the underlying clay layer. Surface ditches or tile drainage can be used. Close spacing is needed between the tiles. Trenches should be backfilled with permeable material. The tile should not be placed too deep in the clay layer.

Wetness is the main limitation in using this soil as a site for dwellings. Septic filter systems do not function well in the clay substratum. The suitability of this soil for dwellings can be improved by lowering the water table.

The capability subclass is IIw.

49—Watseka loamy fine sand. This nearly level, somewhat poorly drained soil occurs as broad upland areas. Individual areas are long or irregularly shaped and range from about 5 to 250 acres.

Typically, the surface layer is black loamy fine sand about 16 inches thick. The subsoil is dark grayish brown and light brownish gray, mottled or loose sand about 14 inches thick. The underlying material to a depth of 60 inches is light brownish gray sand. The subsoil contains bands of loamy sand in some places.

Included with this soil in mapping are small areas of the poorly drained Maumee soils in depressions and the well drained Sparta soils on higher ridges. Also included are areas of the somewhat poorly drained Papineau soils, where the underlying material is silty clay. Included soils make up 3 to 10 percent of the unit.

Water movement is rapid through this soil. Runoff is very slow. The surface layer is easily tilled. The available water capacity is low. The organic-matter content is moderate. The water table is frequently within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The potential is fair to poor for cultivated crops. It is poor for dwellings.

This soil is suited to corn and soybeans. Soil blowing and droughtiness are the main limitations. Keeping tillage at a minimum, establishing field windbreaks, and managing crop residue help to control soil blowing. Some fertilizer is lost through leaching.

Wetness limits the use of this soil as a site for dwellings and septic tank absorption fields. The water table should be lowered.

The capability subclass is IIIs.

69—Milford silty clay loam. This nearly level, poorly drained soil is in broad depressional areas of uplands. It is subject to occasional flooding for brief periods from April to June. Individual areas are wide, long, and irregularly shaped and range from 10 to 300 acres.

Typically, the surface layer is black and very dark gray silty clay loam about 16 inches thick. The subsoil is grayish brown, mottled, firm silty clay loam about 23 inches thick. The underlying material to a depth of about 60 inches is grayish brown, mottled silty clay loam. In some low areas the surface layer is more than 24 inches thick. In other places the subsoil contains less clay than is typical.

Water and air movement is moderately slow in this soil. Runoff is very slow to ponded. The available water capacity is high. The shrink-swell potential is high. The organic-matter content is high. If cultivated when wet, the surface layer forms clods when dry. The water table is frequently within a depth of 2 feet in winter and spring.

Most of the acreage is farmed. The potential is good for cultivated crops. It is poor for dwellings and septic tank absorption fields.

This soil is suited to corn and soybeans. Wetness and poor soil tilth are the main limitations. Ponding occurs during rainy seasons. Tile drains and surface drains function satisfactorily if suitable outlets are available.

Flooding, wetness, and the high shrink-swell potential are the main limitations in using this soil for dwellings. The hazard of flooding can be reduced by surface drainage and landscaping. The seasonal water table should be lowered and foundations designed to overcome the

high shrink-swell potential. Adapting this soil as a septic tank absorption field is difficult.

The capability subclass is IIw.

73—Ross silt loam. This nearly level, well drained soil is on flood plains of rivers and creeks. It is subject to occasional flooding for very brief periods from March to June. Individual areas are long and irregular in shape and range from 2 to 75 acres.

Typically, the surface layer is very dark grayish brown silt loam about 25 inches thick. The subsoil is about 28 inches thick. It is friable dark brown and brown loam. The underlying material to a depth of 60 inches is friable sandy loam. In some places the soil is sandier than is typical and contains some gravel. Also in places it is more clayey or more silty than is typical. In some areas along the Illinois River and Aux Sable Creek, the surface layer is calcareous. In some areas the dark surface layer is less than 20 inches thick.

Included with this soil in mapping and making up less than 12 percent of the unit are small areas of the somewhat poorly drained Lawson soils and poorly drained Sawmill soils, which are lower in the landscape or in shallow depressions.

Water and air movement is moderate in the subsoil and moderately rapid in the underlying material. Runoff is slow. The available water capacity is high. The shrink-swell potential is low. The organic-matter content is moderate. The surface layer is friable and is easily cultivated.

Most of the acreage is farmed. The potential is good for cultivated crops. It is poor for dwellings.

This soil is suitable for corn, soybeans, and small grain and for legumes and grasses for hay and pasture. Flooding is a problem. The duration of the flood is brief, however, and crops usually survive.

Flooding is the main limitation in using this soil as a site for dwellings. Few areas are protected.

The capability class is I.

88B—Sparta loamy fine sand, 1 to 6 percent slopes. This level to gently sloping, excessively drained soil is on ridges on uplands. Individual areas are long and irregularly shaped and range from 3 to 300 acres.

Typically, the surface layer is very dark brown and dark grayish brown loamy fine sand about 20 inches thick. The subsoil is dark yellowish brown loose fine sand about 20 inches thick. The underlying material to a depth of 60 inches is yellowish brown fine sand. In some places the subsoil has bands or thin layers of loamy sand and sandy loam. In some areas segregated iron bands occur in the subsoil. In some areas this soil has a lighter colored surface layer.

Included with this soil in mapping are small areas of the somewhat poorly drained Watseka soils and poorly drained Maumee soils. These soils, in flat or depressional areas, make up to 3 to 5 percent of any one mapped area.

Water and air movement is rapid through this soil, and runoff is slow. The available water capacity is low. The surface layer is loose and is subject to blowing. The organic-matter content is moderately low. Leaching is excessive. The shrink-swell potential is low.

Most of the acreage is farmed. The potential is poor for cultivated crops, pasture, or wildlife. It is fair for recreation use and good for dwellings.

This soil is too droughty for satisfactory yields of corn, soybeans, or small grain. It is highly susceptible to blowing. Soil blowing can be controlled by planting drought-resistant grasses or by crop residue management, rough tillage, field stripcropping, or windbreaks.

If septic systems are used, care should be taken to avoid contamination of the water supply.

The capability subclass is IVs.

89—Maumee loamy fine sand. This nearly level, poorly drained soil is on broad flats and in depressional areas of the uplands. Individual areas are broad, long, or irregularly shaped and range from 3 to 100 acres.

Typically, the surface layer is black and very dark grayish brown loamy fine sand about 15 inches thick. From beneath the surface layer to a depth of more than 60 inches is grayish brown and light brownish gray sand. In some areas the surface layer is more than 24 inches of black loamy fine sand.

Included with this soil in mapping are small areas of the poorly drained Gilford soils and somewhat poorly drained Watseka soils. Gilford soils contain more clay than this Maumee soil. Watseka soils are somewhat poorly drained and are slightly higher in elevation. These included areas make up less than 10 percent of the unit.

Air and water movement is rapid in this soil. Surface runoff is very slow. There is some ponding. The organic-matter content is high. The available water capacity is low. The shrink-swell potential is low. The surface layer is easily tilled, but it is very friable and is subject to blowing when dry. The water table is frequently within 2 feet of the surface in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops. It is poor for dwellings.

Maumee soils are only fairly well suited to corn and soybeans. Ponding during rainy seasons and soil blowing during dry periods are the main limitations. Installing tile or ditch drainage, keeping tillage at a minimum, planting cover crops, and managing crop residue help to overcome those limitations.

Some type of encasement is needed to keep conventional drainage tile from clogging. Overdrainage should be avoided.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table must be lowered and the ponded areas drained.

The capability subclass is IIIw.

91A—Swygert silty clay loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on uplands. Individual areas are long and irregular in shape and range from 3 to 150 acres.

Typically, the surface layer is black and very dark gray silty clay loam about 13 inches thick. The subsoil is about 31 inches thick. The upper part is grayish brown, mottled, firm silty clay. The lower part is gray, mottled, firm silty clay. The underlying material to a depth of 60 inches is very firm silty clay loam. In some places the surface layer is silt loam or sandy loam. Also in some places there are pebbles or small rocks in the subsoil and underlying material.

Included with this soil in mapping are areas of the poorly drained Bryce soils in shallow depressions. These included soils make up less than 10 percent of the unit.

Water and air move at a slow rate through this soil. Surface runoff is slow from cultivated land. The available water capacity is moderate to high. The organic-matter content is moderate. The surface layer is friable to firm. Clods form if the soil is tilled when wet. Root development is restricted in the subsoil because of the high content of clay. The shrink-swell potential is high. The water table is frequently within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops, hay, or pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Wetness is the main limitation. Surface ditches remove excess water. Tile functions poorly. Keeping tillage at a minimum and managing crop residue improve tilth in the surface layer.

Wetness and high shrink-swell are the main limitations in using this soil as a site for dwellings. The seasonal water table must be lowered. Foundations must be designed to overcome the high shrink-swell potential.

The capability subclass is IIw.

91B—Swygert silty clay loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on ridges and side slopes near drainageways in the upland. Individual areas are long or irregularly shaped and range from 3 to 70 acres.

Typically, the surface layer is black silty clay loam about 11 inches thick. The subsoil is about 39 inches thick. The upper part is dark grayish brown and grayish brown, mottled, firm heavy silty clay loam; the lower part is grayish brown and light gray, very firm silty clay. The underlying material to a depth of about 60 inches is grayish brown compact silty clay. In some places the silty clay loam subsoil is exposed. In other places the surface layer is silt loam or a thin layer of sandy loam. In some areas slopes are more than 5 percent or less than 2 percent.

Included with this soil in mapping are small areas of the poorly drained Bryce and Milford soils in drainageways and shallow depressions. These included soils make up 3 to 10 percent of the unit.

Water and air movement is slow in this soil. Runoff is medium to rapid. The organic-matter content is moderate. The available water capacity is moderate to high. The shrink-swell potential is high in the subsoil. The surface layer is firm where eroded. If worked wet, the soil forms clods when dry, particularly on the steeper eroded slopes. The clayey subsoil restricts roots. The water table is frequently within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops or pasture. It is poor for dwellings.

This soil is only fairly well suited to corn and soybeans. Erosion, wetness, and tilth are the main limitations. Keeping tillage at a minimum, contour farming, and managing crop residue help to control erosion. Keeping tillage at a minimum and returning crop residue to the soil improve the workability of the surface layer. Tile drains do not function well in this soil. Grazing when the soil is soft and wet results in surface compaction and excess runoff.

Wetness and a high shrink-swell potential are the main limitations in using this soil as a site for dwellings. The water table should be lowered and foundations designed to overcome the high shrink-swell potential.

The capability subclass is IIe.

98B—Ade loamy fine sand, 1 to 6 percent slopes. This nearly level to gently sloping, somewhat excessively drained soil is on ridges on uplands. Individual areas are irregularly shaped and long and range from 5 to 200 acres.

Typically, the surface layer is very dark grayish brown loamy fine sand about 16 inches thick. The subsurface layer is dark brown loamy fine sand about 6 inches thick. The subsoil is about 48 inches of yellowish brown and brown fine sand that has 1- to 8-inch bands of strong brown fine sandy loam in the lower part. It is medium acid. In some places the surface layer is lighter colored than is typical. In other places the entire subsoil is fine sand, without bands of sandy loam, or it has more gray colors than is typical. In some places the subsoil is neutral. The sandy loam bands in the lower part of the subsoil are thicker than 8 inches in some places. In some small areas the clayey layers occur at about 40 inches or deeper.

Included with this soil in mapping are small areas of the poorly drained Gilford and Selma soils in shallow depressions or drainageways. These included soils make up 2 to 5 percent of the unit.

Water and air movement is rapid through this soil. Runoff is slow. The organic-matter content is moderately low. The available water capacity is low. The surface layer is very friable. The shrink-swell potential is low.

Most of the acreage is farmed. Some areas are idle. The potential is fair to poor for cultivated crops, hay, pasture, or trees. It is good for dwellings and septic tank absorption fields.

This soil is fairly well suited to poorly suited to corn, soybeans, and small grain. Droughtiness, low fertility, and soil blowing (fig. 10) are the main limitations. Keeping tillage at a minimum, leaving crop residue on the surface, and planting windbreaks help to reduce soil blowing.

Figure 10.—Soil blowing, resulting from lack of organic residue, on Ade loamy fine sand.

This soil is satisfactory for dwellings and other construction sites. Droughtiness makes it difficult to establish lawns, shrubs, and trees. Ground water contamination from septic tank absorption fields is a possible hazard.

The capability subclass is IIIs.

107—Sawmill silty clay loam. This nearly level, poorly drained soil is in broad level or slightly depressional areas on flood plains along the rivers and major drainageways. It is subject to frequent flooding for brief periods from March to June. Areas are long stretches of varying widths paralleling the river or stream channel. Individual areas range from a few acres to more than 200 acres.

Typically, the surface layer is black silty clay loam 15 inches thick. The subsurface layer is very dark gray silty clay loam about 10 inches thick. The subsoil to a depth of about 60 inches is dark gray and gray silty clay loam. In some places silt loam and sandy or gravelly layers occur in the lower part. In some small areas this soil has a lower clay content than is typical and is better drained. In some mucky areas the water table is high. Along the Illinois River and Aux Sable Creek the surface layer is calcareous.

Included in mapping and making up less than 15 percent of the unit are small areas of the somewhat poorly drained Lawson soils that are at a slightly higher elevation or nearer the main channel.

Water and air movement is moderate to moderately slow through this soil. Runoff is slow. The available water capacity is high. This soil is high in organic-matter

content. The surface layer is sticky when wet. The water table is frequently within a depth of 2 feet in winter and spring. The shrink-swell potential is moderate.

Most areas of this soil are farmed. Some are in grass and trees, either pastured or idle. The potential is good for cultivated crops or pasture. It is poor for dwellings.

This Sawmill soil is suited to corn, soybeans, small grain, and grasses. Wetness and flooding are the main limitations. Drainage ditches are used to remove surface water. Returning crop residue to the soil helps to improve tilth and reduce crusting. Floodwaters recede too slowly in some years for crops to survive.

This soil is generally not suitable for dwellings and septic tank absorption fields because of the wetness and flooding. The areas are not protected.

The capability unit is IIw.

125—Selma loam. This nearly level, poorly drained soil is in level and slightly depressional upland areas. It is subject to occasional flooding for brief periods from April to June. Individual areas are long or irregular in shape and range from 10 to 500 acres.

Typically, the surface layer is black and very dark gray loam about 16 inches thick. The subsoil is about 29 inches thick. The upper part is gray loam, the middle part is light gray mottled clay loam, and the lower part is light gray sandy clay loam. The underlying material to a depth of 60 inches is light gray and yellowish brown sand. It contains layers of silt loam and loam in the lower part. In some places the subsoil is silty clay loam. In some areas the underlying material is clay loam, loam, or silty clay loam with numerous pebbles or small rocks.

Included with this soil in mapping are small areas of the somewhat poorly drained Darroch and Andres soils and the well drained Jasper soils. All are on low ridges. They make up 2 to 5 percent of the unit.

Air and water movement is moderate in the subsoil and moderate to moderately rapid in the underlying material. Runoff is very slow or ponded. The available water capacity is high. The organic-matter content is high. The surface layer tends to be sticky when wet. The shrink-swell potential is moderate.

Most of the acreage is farmed. The potential is good for cultivated crops or hay and pasture. It is poor for dwellings.

This Selma soil is suited to corn, soybeans, small grain, and grasses. Drainage is the major limitation. Tile drainage is feasible. Adequate outlets are sometimes difficult to obtain.

Wetness and flooding are the main limitations in using this soil as a site for dwellings. The flood hazard can be reduced by surface drainage and landscaping. The seasonal water table should be lowered.

The capability subclass is IIw drained.

132—Starks silt loam. This nearly level, somewhat poorly drained soil is on broad upland ridges near major streams. Individual areas are long and irregularly shaped and range from 10 to about 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 36 inches thick. The upper part is brown and dark brown, mottled silty clay loam. The middle part is dark yellowish brown, mottled clay loam. The lower part is stratified yellowish brown, mottled sandy loam, loam, and loamy sand and some gravel. The underlying material to a depth of about 60 inches is stratified loam, sandy loam, and coarse sand. In some places the surface layer is fine sandy loam, and the upper part of the subsoil is sandy clay loam. In some places the surface layer is darker colored than is typical. In some areas the subsoil and substratum have more clay.

Less than 10 percent of the unit is small areas of the well drained Martinsville soils on ridges and the poorly drained Selma and Drummer soils in depressions.

Water and air movement is moderately slow in the subsoil and moderately rapid in the underlying material. Runoff is slow. The available water capacity is high. The organic-matter content is moderate to moderately low. The shrink-swell potential is moderate. The surface layer tends to compact when excessively cultivated or after a hard rain. This soil is somewhat slow to warm up in the spring. The water table is occasionally within a depth of 3 feet in winter and spring.

Most areas of this soil are farmed. The potential is fair to good for cultivated crops or pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Managing crop residue and keeping tillage at a minimum help to prevent compaction of the surface layer. Tile drains and surface ditches function satisfactorily if suitable outlets are available.

Wetness is the main limitation in using this soil as a site for dwellings. The water table should be lowered.

The capability subclass is IIw.

145B—Saybrook silt loam, 1 to 5 percent slopes. This nearly level to gently sloping, moderately well drained soil is on ridges in the upland. Individual areas are round, long, or irregularly shaped and range from 3 to 25 acres.

Typically, the surface layer is black and dark brown silt loam about 14 inches thick. The subsoil is about 23 inches thick. The upper part is dark yellowish brown, firm silty clay loam. The middle part is yellowish brown, mottled, firm silty clay loam. The lower part of the subsoil and the underlying material to a depth of about 60 inches is light olive brown and light yellowish brown calcareous loam. In some places depth to the calcareous loam till is more than 40 inches. In some places the upper and middle parts of the subsoil are sandier than is typical, and the underlying material is more clayey.

Included with this soil in mapping are areas of the somewhat poorly drained Elliott soils and Brenton soils in nearly level areas and the poorly drained Drummer soils

in depressions or drainageways. These included soils make up 5 to 10 percent of the unit.

Water and air move at a moderate rate through this soil. Runoff is medium. The available water capacity is high. The organic-matter content is moderate. The surface layer is friable and is easily tilled. The shrink-swell potential is moderate in the subsoil.

Most of the acreage is farmed. The potential is good for cultivated crops, hay, and pasture. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is the main limitation. Contour farming, terracing, keeping tillage at a minimum, and managing crop residue help to control erosion.

Wetness is the main limitation in using this soil as a site for dwellings. For dwellings with basements, the water table should be lowered.

The capability subclass is IIe.

145C2—Saybrook silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is on side slopes along drainageways in the upland. Individual areas are round, long, or irregularly shaped and range from 3 to 50 acres.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is about 30 inches thick. The upper part is dark yellowish brown, firm silty clay loam. The middle part is yellowish brown, mottled, firm silty clay loam. The lower part of the subsoil and the underlying material to a depth of about 60 inches are light olive brown and light yellowish brown, calcareous loam. In some places the lower part of the subsoil and the underlying material are stratified sandy loam, loamy sand, or sand.

Included with this soil in mapping are areas of the somewhat poorly drained Elliott soils and poorly drained Drummer soils in drainageways and at the base of slopes. These included soils make up 3 to 8 percent of the unit.

Water and air move at a moderate rate through this soil. Runoff is rapid. The available water capacity is high. The organic-matter content is moderate. The surface layer is friable and is easily tilled.

Most of the acreage is farmed. The potential is fair to good for cultivated crops, hay, and pasture. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain, and to grasses and legumes for hay and pasture. Erosion is the main limitation. Some large areas can be contoured and terraced to reduce soil losses. Keeping tillage at a minimum and managing crop residue help to control erosion.

Wetness is the main limitation in using this soil as a site for dwellings. For dwellings with basements, the water table should be lowered.

The capability subclass is IIe.

146A—Elliott silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on broad ridges in the upland. Individual areas are long and irregularly shaped and range from 3 to 150 acres.

Typically, the surface layer is black silt loam about 10 inches thick. The subsurface layer is very dark gray silt loam about 5 inches thick. The subsoil is about 23 inches thick. It is dark grayish brown and grayish brown, mottled, firm silty clay loam in the upper and middle parts and gray, mottled silty clay loam in the lower part. The underlying material to a depth of about 60 inches is mixed yellowish brown and gray, firm silty clay loam. In some areas the middle part of the subsoil has more sand than is typical.

Included with this soil in mapping are small areas of the moderately well drained Varna soils on ridges and the poorly drained Ashkum soils in depressions and drainageways. These included soils make up less than 10 percent of the unit.

Water and air move at a moderately slow rate through this soil. The available water capacity is high. Runoff is slow. The organic-matter content is high. The shrink-swell potential is moderate. In spring the soil has a perched water table within 3 feet of the surface.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Drainage is needed for optimum yields. Surface drains and properly spaced tile drains function satisfactorily if suitable outlets are available. Keeping tillage at a minimum and managing crop residue help to increase water infiltration and improve soil tilth. The lower part of the subsoil and the underlying material restrict roots.

Wetness is the main limitation in using this soil as a site for dwellings. The water table should be lowered.

The capability subclass is IIw.

146B—Elliott silt loam, 2 to 5 percent slopes. This gently, sloping, somewhat poorly drained soil is on ridges and on side slopes along drainageways in the upland. Individual areas of this soil are long or irregularly shaped and range from 3 to 30 acres.

Typically, the surface layer is black silt loam about 12 inches thick. The subsoil is about 30 inches thick. The upper part is yellowish brown, mottled, firm silty clay loam, and the lower part is grayish brown, mottled silty clay loam containing some pebbles or small rocks. The underlying material to a depth of 60 inches is calcareous silty clay loam glacial till with numerous pebbles or rocks. In some places the surface layer is very dark grayish brown silt loam. In severely eroded areas it is silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Ashkum soils in depressions of drainageways and the moderately well drained Varna soils on higher ridges or on upper parts of slopes. These included soils make up 3 to 10 percent of the unit.

Water and air movement is moderately slow through this soil. Runoff is medium. The available water capacity is high. The surface layer is friable. The organic-matter content is high. If eroded, the soil is sticky when wet and tends to form clods when dry. The shrink-swell potential is moderate. In spring the perched water table is occasionally within 3 feet of the surface.

Most of the acreage is farmed. The potential is fair to good for cultivated crops, small grain, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. Erosion occurs in cultivated areas. Keeping tillage at a minimum, managing crop residue, and contour farming help to control erosion. Properly spaced tile drains are needed.

Wetness is the main limitation in using this soil as a site for dwellings. The water table should be lowered.

The capability subclass is IIe.

148A—Proctor silt loam, 0 to 2 percent slopes. This nearly level, well drained soil is on ridgetops or along and near drainageways in the upland. Individual areas are long or irregularly shaped and range from 3 to 100 acres.

Typically, the surface layer is black silt loam about 14 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown and dark yellowish brown silty clay loam; the lower part is dark yellowish brown, stratified clay loam and silty clay loam. The underlying material to a depth of 60 inches is stratified silt loam, loam, and sandy loam. In some places the subsoil is loam and the substratum is calcareous loam containing some pebbles.

Included with this soil in mapping are areas of the somewhat poorly drained Brenton and Martinton soils and the poorly drained Drummer and Milford soils. These soils in flat areas, low depressions, or drainageways make up to 2 to 8 percent of any one mapped area.

Water and air move at a moderate rate in the subsoil and at a moderate to moderately rapid rate in the underlying material. Runoff is slow to medium. The available water capacity is high. The organic-matter content is moderate. The surface layer is friable and is easily tilled. The shrink-swell potential is moderate.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, pasture, and trees. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. It has no severe limitations.

Shrink swell is a moderate limitation in using this soil as a site for dwellings. Foundations should be designed to withstand the shrinking and swelling of the soil.

The capability class is I.

148B—Proctor silt loam, 2 to 5 percent slopes. This gently sloping, well drained soil is on ridges or on slopes along drainageways in the upland. Areas along drainageways are usually long and narrow and range from 5 to 25 acres. Areas on ridges are wide and long or round and range from 10 to 200 acres.

Typically, the surface layer is very dark grayish brown and dark brown silt loam about 15 inches thick. The subsoil is about 30 inches thick. It is dark brown silt loam and silty clay loam in the upper and middle parts and dark brown silty clay loam and clay loam in the lower part. The underlying material to a depth of about 60 inches is dark brown sandy loam. In some places the subsoil is mixed with the surface layer, making the plow layer more clayey. In some areas the subsoil has more sand than is typical. In a few places carbonates are within a depth of 40 inches. In many areas the underlying material is stratified loam, silt loam, and clay loam and layers of gravel. Some areas along drainageways have slopes of more than 5 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Brenton soils on flats and the poorly drained Drummer, Sawmill, or Milford soils in drainageways. Included soils make up about 5 to 10 percent of the unit.

Water and air move at a moderate rate in the subsoil and at a moderate and moderately rapid rate in the underlying material. Runoff is medium. The available water capacity is high. The organic-matter content is moderate. The surface layer is friable except where the soil is eroded and the clayey subsoil material is mixed into the plow layer. The shrink-swell potential is moderate.

Most of the acreage is farmed. The potential is good for cultivated crops, hay, and pasture. It is fair to good for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is the main limitation. Residue management, which incorporates crop residue into the surface layer, will reduce soil losses. Some areas can be contoured or terraced. Grasses and legumes also reduce soil losses.

Shrink swell is a moderate limitation in using this soil as a site for dwellings. Foundations should be designed to withstand the shrinking and swelling of the soil.

The capability subclass is IIe.

149—Brenton silt loam. This nearly level, somewhat poorly drained soil is on low ridges in the uplands. Individual areas are long and irregularly shaped and range from 5 to 300 acres.

Typically, the surface layer is about 10 inches of black silt loam over 4 inches of very dark grayish brown silt loam. The subsoil is about 26 inches thick. The upper and middle parts are dark brown and grayish brown, mottled silty clay loam. The lower part is light brownish gray, mottled, stratified sandy loam and silt loam. The underlying material to a depth of about 60 inches is calcareous sand and gravelly sand. In some areas the subsoil is sandier than is typical. In some areas the lower part of the subsoil is calcareous at a depth of less than

40 inches. In some areas the lower part of the substratum is stratified loam, sandy clay loam, fine sandy loam, and silt loam. Depth to the underlying stratified sandy material is more than 40 inches in some places.

Included with this soil in mapping are small areas of the well drained Proctor soils on ridges and the poorly drained Drummer soils in shallow depressions. These included soils make up less than 10 percent of the unit.

Water and air movement is moderate in the subsoil and rapid in the underlying material. The available water capacity is high. Runoff is slow. The organic-matter content is high. The surface layer is friable and is easily tilled. The shrink-well potential is moderate in the subsoil. The water table is commonly within a depth of 3 feet in winter and spring.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table should be lowered.

The capability class is I.

151—Ridgeville fine sandy loam. This nearly level, somewhat poorly drained soil is on uplands. Individual areas are irregularly shaped and range from 2 to 30 acres.

Typically, the surface layer is black fine sandy loam about 14 inches thick. The subsurface layer is very dark gray fine sandy loam about 6 inches thick. The subsoil is about 30 inches thick. The upper part is dark grayish brown, mottled, friable fine sandy loam. The middle part is brown and grayish brown, mottled sandy loam. The lower part is grayish brown loamy sand. The underlying material to a depth of about 60 inches is grayish brown sand. In some places the subsoil has more clay than is typical. In other places it is sandier. In some areas the surface layer is loamy sand.

Included with this soil in mapping are small areas of the somewhat excessively drained Ade soils on ridges and the poorly drained Gilford and Selma soils in depressions. These included soils make up 2 to 5 percent of the unit.

Water and air move at a moderate to moderately rapid rate in the subsoil and at a rapid rate in the underlying material. Runoff is slow. The available water capacity is moderate. The shrink-swell potential is low. The organic-matter content is moderate. The surface layer is friable and is easily tilled. The water table is occasionally within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. One of the main limitations is soil blowing. Keeping tillage at a minimium and managing crop residue help to prevent soil loss.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table should be lowered.

The capability subclass is IIs.

152—Drummer silty clay loam. This nearly level to slightly depressional, poorly drained soil is on broad uplands. It is subject to occasional flooding for brief periods from March to June. Individual areas are long and irregular in shape and range from 10 to 200 acres.

Typically, the surface layer is black silty clay loam about 14 inches thick. The subsoil is about 39 inches thick. The upper part is olive gray, mottled silty clay loam. The middle part is light olive gray silty clay loam and silt loam. The lower part is light yellowish brown and yellowish brown, stratified loam and sandy loam. The underlying material to a depth of 60 inches is mixed light gray and yellowish brown fine sandy loam. In some places the subsoil is more clayey than is typical. In other places it is more sandy. Also in some places the black surface layer is more than 24 inches thick. In places the substratum is more clayey than is typical.

Included with this soil in mapping are small areas of the well drained Proctor and Jasper soils on small ridges and the level, somewhat poorly drained Darroch and Brenton soils slightly higher in elevation than Drummer soils. These included areas make up 5 to 8 percent of the unit.

Water and air move at a moderate rate through this soil. Runoff is very slow. Some of it ponds. The available water capacity is high. The shrink-swell potential is moderate. The organic-matter content is high. The surface layer is sticky when wet. The water table is commonly within a depth of 2 feet in winter and spring.

Most of the acreage is farmed. This soil has good potential for cultivated crops, hay, and pasture. It has poor potential for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Wetness is the main limitation. Tile drainage is effective.

Wetness and flooding are the main limitations in using this soil as a site for dwellings. The seasonal water table should be lowered. The hazard of flooding can be reduced by surface drains and landscaping.

The capability subclass is IIw drained.

184—Roby fine sandy loam. This nearly level, somewhat poorly drained soil is on upland ridges near major streams and drainageways. Individual areas are long and irregularly shaped and range from 10 to 250 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 6 inches thick. The subsurface layer is pale brown loamy fine sand about 4 inches thick. The subsoil is about 22 inches thick. The upper part is pale brown, mottled loamy fine sand, and the lower part is light brownish gray, mottled fine sandy loam. The under-

lying material to a depth of about 60 inches is stratified, light brownish gray loamy fine sand and yellowish brown and strong brown fine sandy loam. In some areas the surface layer is very dark grayish brown. In some areas the subsoil is less clayey than is typical, and the underlying material is sandier.

Included with this soil in mapping and making up less than 10 percent of the unit are small areas of the poorly drained Gilford and Selma soils in depressions and the well drained Martinsville soils and somewhat excessively drained Ade soils on ridges.

Water and air movement is moderate in the subsoil and moderately rapid in the underlying material. Runoff is slow. The available water capacity is moderate. The shrink-swell potential is low. The organic-matter content is moderately low. The surface layer is very friable. It tends to compact easily under traffic. The water table is occasionally within a depth of 3 feet in winter and spring.

Most of the acreage is farmed, but much of it is wooded. The potential is fair for cultivated crops and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Keeping tillage at a minimum, establishing field windbreaks, and managing crop residue help to control soil blowing. Returning crop residue and regular additions of other organic matter improve soil tilth.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table should be lowered.

The capability subclass is IIs.

189A—Martinton silt loam, 0 to 3 percent slopes. This nearly level, somewhat poorly drained soil is on slightly elevated ridges on uplands. Individual areas are wide, long, and irregularly shaped and range from 5 to 200 acres.

Typically, the surface layer is black silt loam about 12 inches thick. The subsoil is about 25 inches thick. The upper part is grayish brown, mottled silty clay loam, and the lower part is light brownish gray, mottled silty clay loam. The underlying material to a depth of 60 inches is firm silty clay loam. In some areas the underlying material is silty clay.

Included with this soil in mapping are small areas of the poorly drained Milford and Bryce soils. These soils, in drainageways and shallow depressions, make up 3 to 8 percent of any one mapped area.

Water and air move at a moderately slow rate in the subsoil and at a slow rate in the underlying material. Runoff is slow to medium. The organic-matter content is high. The available water capacity is high. The surface layer is easily tilled. The shrink-swell potential is moderate. The water table is occasionally within a depth of 3 feet in winter and spring.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, pasture, and trees. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. The wetness and the moderately slow permeability are the main limitations. Tile drainage is moderately effective.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table should be lowered.

The capability subclass is IIw.

194B—Morley silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on convex ridges and side slopes on uplands near drainageways. Individual areas are irregularly shaped and range from 2 to 30 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsurface layer is brown silt loam about 6 inches thick. The subsoil is yellowish brown silty clay loam about 27 inches thick. The lower part contains some pebbles. The underlying material to a depth of about 60 inches is yellowish brown and light brownish gray silty clay loam containing a few pebbles or small rocks. In some places the surface layer is much thinner and contains more clay than is typical. In some areas there are no pebbles or rocks in the subsoil.

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

Water and air move through this soil at a slow rate. Runoff is medium. The organic-matter content is moderate. The available water capacity is high. The shrink-swell potential is moderate. The surface layer is very friable but compacts easily under traffic, excessive cultivation, or hard rains. The perched water table is frequently between depths of 3 and 6 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops, hay, pasture, and trees. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is the main problem. Keeping tillage at a minimum, contouring, and managing crop residue help to reduce soil loss. Returning crop residue reduces soil compaction and increases water infiltration. Overgrazing or grazing when the soil is wet results in surface compaction, excessive runoff, and poor tilth.

The shrink-swell potential and wetness are the main limitations in using this soil as a site for dwellings. The water table should be lowered. Foundations must be designed to withstand the shrinking and swelling of the soil.

The capability subclass is IIe.

194C3—Morley silty clay loam, 5 to 10 percent slopes, severely eroded. This sloping, moderately well drained soil is on ridges and side slopes near upland

drainageways. Individual areas are irregularly shaped and range from 2 to 20 acres.

Typically, the surface layer is dark yellowish brown silty clay loam about 7 inches thick. The subsoil is about 15 inches thick. The upper part is dark yellowish brown silty clay, and the lower part is yellowish brown, mottled silty clay loam. The underlying material to a depth of about 60 inches is silty clay loam that contains a few pebbles and small rocks. In some areas the surface layer is dark grayish brown silt loam.

Included with this soil in mapping are areas of the somewhat poorly drained Blount soils and poorly drained Ashkum soils. These included soils, in level and slightly depressional areas or at the heads of drainageways, make up 5 to 10 percent of the unit.

Water and air move through this soil at a slow rate. Runoff is rapid. The organic-matter content is low. The available water capacity is high. The surface layer forms clods if cultivated when wet. The shrink-swell potential is high. In spring the soil has a perched water table 3 to 6 feet below the surface.

Most of the acreage is cropped or is in permanent pasture and trees. The potential is fair for cultivated crops, hay, pasture, and trees. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is the main limitation. Keeping tillage at a minimum, including a close growing crop in the cropping system, managing crop residue, terracing, and contouring help to control soil loss.

Wetness and shrink swell are the main limitations in using this soil as a site for dwellings. Foundations should be designed to withstand the shrinking and swelling of the soil. In addition, for dwellings with basements, the water table should be lowered.

The capability subclass is IVe.

201—Gilford fine sandy loam. This nearly level, poorly drained soil is in slightly depressional areas on uplands. It is subject to occasional flooding for brief periods in the winter and spring. Individual areas are irregularly shaped and range from 5 to 300 acres.

Typically, the surface layer is 10 inches of black very friable fine sandy loam over 12 inches of very dark gray and very dark grayish brown fine sandy loam. The subsoil is about about 19 inches thick. It is friable, dark grayish brown and grayish brown, mottled fine sandy loam. The underlying material to a depth of 60 inches is loose sand. In some places the subsoil is sandy loam or sandy clay loam. In some places the underlying material contains layers of heavy silty clay loam or silty clay lakebed sediments.

Included with this soil in mapping are small areas of the well drained Ade soils and somewhat poorly drained Ridgeville soils. These included soils are slightly higher in elevation than Gilford soils. They make up 2 to 5 percent of the unit.

Water moves at a moderately rapid rate in the subsoil but at a rapid rate in the substratum. The lack of good soil structure somewhat restricts aeration. Runoff is very slow and occasionally ponds. The available water capacity is moderate. The organic-matter content is high. The surface layer is very friable and is easily tilled. The shrink-swell potential is low. The water table is occasionally within a depth of 1 foot in winter and spring.

Most areas of this soil are farmed. The potential is fair to good for cultivated crops, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, small grain, and truck crops and to grasses and legumes. Drainage is the main limitation. Surface ditching or tile drainage can be used. Encasing the tile with fiberglass or blinding it with plastic film or heavy roofing paper prevents the tile from being plugged with sand and losing proper alinement. Tile should be butted closely or plastic tile should be used. Ditchbanks cave in easily.

Wetness and flooding are the main limitations in using this soil as a site for dwellings. The seasonal water table should be lowered. Surface drains and landscaping reduce the hazard of flooding.

The capability subclass is IIIw.

223B—Varna silt loam, 2 to 5 percent slopes. This gently sloping, moderately well drained soil is on upland ridges and side slopes along or near the heads of drainageways. Individual areas are narrow and long or irregularly shaped and range from 3 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 13 inches thick. The subsoil is about 26 inches thick. It is dark yellowish brown and yellowish brown, firm silty clay loam. The underlying material to a depth of about 60 inches is silty clay loam containing some pebbles and sand. In some places the surface is silty clay loam. In other places the subsoil contains less clay than is typical.

Included with this soil in mapping and making up less than 10 percent of the unit are small areas of the somewhat poorly drained Elliott soils in the more level parts of the unit and the poorly drained Ashkum soils in or at the heads of drainageways.

Water and air movement is moderately slow through this soil. Runoff is medium. The available water capacity is high. The organic-matter content is moderate. The surface layer is easily tilled. The shrink-swell potential is moderate. The water table frequently fluctuates between 3 and 6 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops and pasture. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is the main limitation. Keeping tillage at a minimum, terracing, contouring, managing crop residue, and including a close growing crop in the cropping system help to control erosion.

Wetness and shrink swell are the main limitations in using this soil as a site for dwellings. For dwellings with and without basements, the foundations should be de-

signed to withstand the shrinking and swelling of the soil. The seasonal water table should be lowered if the soil is to be used as a site for dwellings with basements.

The capability subclass is IIe.

223C3—Varna silty clay loam, 5 to 10 percent slopes, severely eroded. This sloping, moderately well drained soil is on side slopes along drainageways in uplands. Individual areas commonly are narrow and long, but some are irregularly shaped. They range from 3 to 60 acres.

Typically, the surface layer is very dark grayish brown silty clay loam about 7 inches thick. The subsoil is silty clay loam about 26 inches thick. The upper part is brown, and the lower part is yellowish brown. In some areas the underlying material is calcareous silty clay loam, and in others it is silty clay. In some places the surface layer is silt loam.

Included with this soil in mapping and making up less than 10 percent of the unit are small areas of the somewhat poorly drained Elliott soils and poorly drained Ashkum and Drummer soils. Elliott soils are in the more level areas of the unit or at the base of slopes. Ashkum and Drummer soils are in drainageways.

Water and air movement is moderately slow in this soil. Runoff is rapid. The available water capacity is high. The shrink-swell potential is moderate. The organic-matter content is moderate. The surface layer tends to be sticky when wet. The water table is frequently between depths of 3 and 6 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops and pasture. It is fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Erosion is the main limitation. Keeping tillage at a minimum, terracing, contouring, managing crop residue, and including a hay or pasture crop in the cropping system help to control erosion. Returning crop residue and adding other organic matter to the soil help to maintain fertility, improve tilth, and increase water intake.

Wetness and shrink swell are the main limitations in using this soil as a site for dwellings. Foundations must be designed to withstand the shrinking and swelling of the soil. For dwellings with basements, the water table should be lowered.

The capability subclass is IVe.

228A—Nappanee silt loam, 0 to 2 percent slopes. This nearly level, somewhat poorly drained soil is on upland ridges near rivers and major streams. Individual areas are irregularly shaped and range from 4 to 50 acres.

Typically the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is dark brown silty clay loam about 4 inches thick. The subsoil is about 39 inches thick. The upper part is brown, firm light silty clay mottled with gray, and the lower part is grayish brown, firm silty clay. The underlying material is calcareous silty clay. In some places the substratum is stratified silty clay loam and silt loam.

Included with this soil in mapping and making up less than 10 percent of the unit are small areas of the poorly drained Ashkum and Bryce soils in depressions and in drainageways.

Water and air movement is very slow through this soil. Runoff is slow. The available water capacity is moderate. The surface layer is moderately low in supply of organic matter and tends to become very dense under traffic or hard rains. The shrink-swell potential is high. The water table is frequently within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The potential is poor for crops, pasture, or timber. It is poor for dwellings.

Corn, soybeans, and grasses can be grown, but growth is hampered by poor root development and low natural fertility. Keeping tillage at a minimum and managing crop residue improve soil tilth and increase water intake. The soil dries slowly in spring. Surface drains are needed.

Shrink swell and wetness are the main limitations in using this soil as a site for dwellings. The water table should be lowered. Foundations must be designed to withstand the shrinking and swelling of the soil.

The capability subclass is IIIw.

228B—Nappanee silt loam, 2 to 5 percent slopes. This gently sloping, somewhat poorly drained soil is on upland ridges near rivers and major streams. Individual areas are irregularly shaped and range from 4 to 50 acres.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 23 inches thick. The upper part is light yellowish brown, firm silty clay loam, and the lower part is grayish brown, mottled, firm silty clay. The underlying material to a depth of 60 inches is calcareous silty clay loam. In some places the substratum is stratified silty clay loam and silt loam.

Included with this soil in mapping and making up less than 10 percent of the unit are small areas of the poorly drained Ashkum and Bryce soils in depressions and in drainageways.

Water and air movement is very slow through this soil. Runoff is medium. The available water capacity is moderate. The surface layer is moderately low in organic matter. It tends to become very dense under traffic or hard rains. The shrink-swell potential is high. The water table is frequently within a depth of 3 feet in winter and spring.

Most of the acreage is farmed. The potential is poor for crops, pasture, or timber. It is poor for dwellings.

Corn, soybeans, and grasses can be grown, but growth is restricted by poor root development and low natural fertility. Erosion is a limitation on long gentle slopes. Keeping tillage at a minimum, managing crop residue, contouring, and terracing help to control erosion.

Returning crop residue and the regular addition of other organic matter to this soil help to maintain fertility, improve soil tilth, and increase water intake.

Shrink swell and wetness are the main limitations in using this soil as a site for dwellings. Foundations should be designed to withstand the shrinking and swelling of the soil, and the seasonal water table should be lowered.

The capability subclass is IIIe.

232—Ashkum silty clay loam. This nearly level, poorly drained soil is on broad flats and in slightly depressional areas in uplands. It is subject to occasional flooding for brief periods in April and May. Individual areas are long and range from 10 to 1,000 acres.

Typically, the surface layer is black silty clay loam about 17 inches thick. The subsoil is about 27 inches thick. The upper part is grayish brown, mottled silty clay loam. The lower part is light olive gray and light gray silty clay loam that contains some pebbles. The underlying materal to a depth of about 65 inches is yellowish brown silty clay loam that contains some pebbles or rocks. In some places the surface layer is less than 10 inches thick. In some places the subsoil has less clay and more sand than is typical. In some areas the subsoil is clay.

Included with this soil in mapping and making up less than 5 percent of the unit are small areas of the somewhat poorly drained Elliott soils. These soils are slightly higher in elevation than Ashkum soils.

Water and air move through this soil at a moderately slow rate. Runoff is very slow. Some areas are ponded after heavy rains. The organic-matter content is high. The available water capacity is high. The surface layer is sticky when wet. The shrink-swell potential is moderate. The water table is often within a depth of 2 feet in winter and spring.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, or pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Wetness, slow runoff, and ponding are the main limitations. Tile drainage and surface drains are fairly effective if adequate outlets can be provided.

Wetness and flooding are the main limitations in using this soil as a site for dwellings. The seasonal water table should be lowered. Surface drains and landscaping reduce the hazard of flooding.

The capability suclass is IIw.

235—Bryce silty clay. This nearly level, poorly drained soil is on flat and slightly depressional uplands. It is subject to occasional flooding for brief periods from March to June. Individual areas are either long depressional areas in drainageways of 2 to 10 acres or large irregularly shaped areas up to 500 acres.

Typically, the surface layer is black silty clay about 11 inches thick. The subsoil is about 30 inches thick. The upper part is very dark gray, firm silty clay, and the lower part is gray and dark gray, mottled, very firm silty clay. The underlying material to a depth of about 60 inches is gray, calcareous silty clay. In some places the surface layer is silty clay loam or silt loam. In some places the surface layer is more than 20 inches thick.

Included with this soil in mapping are small areas of the somewhat poorly drained Swygert and Martinton soils. These included soils are in slightly elevated areas and make up less than 10 percent of the unit.

Water and air move through this soil at a slow rate. Runoff is very slow. Some areas are temporarily ponded. The available water capacity is moderate. The organic-matter content is high. The surface layer is very sticky when wet. The very clayey subsoil restricts root development. The shrink-swell potential is moderate. The water table is often within a depth of 1 foot in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain. It is too wet for good pasture or hay production. Keeping tillage at a minimum, managing crop residue, and adding other organic matter to the soil improve tilth. Tile drainage is ineffective because of the slow permeability. Surface drains can be used.

Wetness and flooding are the main limitations in using this soil as a site for dwellings. The seasonal water table should be lowered. Surface drains and landscaping reduce the hazard of flooding.

The capability subclass is IIw.

241G—Chatsworth silt loam, 15 to 50 percent slopes. This moderately steep to very steep, moderately well drained soil is on upland side slopes along rivers, creeks, and major drainageways. Individual areas are long and wide, commonly including the main drainageway and the side ravines. They range from 5 to 250 acres.

Typically, the surface layer is dark grayish brown silt loam about 5 inches thick. The subsoil is brown very firm silty clay about 8 inches thick. The underlying material to a depth of 60 inches is very firm calcareous clay. In some places the surface layer is silty clay loam or loam. In places the subsoil and substratum are loamy.

Included with this soil in mapping and making up less than 15 percent of the unit are areas of the well drained Ross soils in creek or drainageway bottoms and the moderately well drained Morley soils on upper slopes.

Water and air movement is very slow through this soil. Surface runoff is very rapid. The available water capacity is low. The organic-matter content is moderately low. The shrink-swell potential is moderate. The water table is frequently between depths of 3 and 6 feet in winter and spring.

Most of the acreage is wooded. Some of the wooded acreage is pastured.

This soil is poorly suited to crops, pasture, or trees. It is too steep for cultivation, and it tends to stay wet in

spring. Pasture renovation is usually not feasible. Timber production can be improved if the wooded areas are protected from grazing. Steep slopes limit the use of equipment.

This soil has poor potential as a site for dwellings. It is too steep and clayey.

The capability subclass is VIIe.

290B—Warsaw sandy loam, 1 to 5 percent slopes. This nearly level and gently sloping, well drained soil is on the ridges of river terraces. Individual areas are long or irregularly shaped and range from 4 to 60 acres.

Typically, the surface layer is black friable loam about 20 inches thick. The subsoil is about 16 inches thick. It is dark yellowish brown, friable sandy clay loam that is about 5 percent gravel. The underlying material to a depth of about 60 inches is calcareous gravelly loamy sand and gravelly sand. In some areas the surface layer and subsoil are sandier than is typical and have a very low clay content. In some places shale and sandstone bedrock are within 60 inches.

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

Water and air movement is moderately rapid in this soil. Runoff is medium. The organic-matter content is moderate. The available water capacity is moderate. The shrink-swell potential is low. The surface layer is very friable.

Most of the acreage is farmed. The potential is fair for cultivated crops, small grain, hay, and pasture. Some areas provide a source of sand. The potential is good as a site for dwellings.

This Warsaw soil is suitable for corn, soybeans, small grain, truck crops, hay, and pasture. Droughtiness and erosion are the main limitations. Keeping tillage at a minimum, managing crop residue, and contouring help to control erosion and increase the available water capacity. Irrigation is practical for truck crops.

There is some danger of polluting the water supply if septic systems are used. The septic filter fields should be installed a safe distance from wells. This soil is a good source of sand and gravel.

The capability subclass is IIe.

293—Andres silt loam. This nearly level, somewhat poorly drained soil is on uplands. Individual areas are irregularly shaped and range from 5 to more than 200 acres.

Typically, the surface layer is black silt loam about 16 inches thick. The subsoil is about 25 inches thick. The upper part is yellowish brown, firm clay loam. The middle part is grayish brown, mottled, firm clay loam. The lower part is yellowish brown and light olive gray silty clay loam. The underlying material to a depth of 60 inches is calcareous yellowish brown and light olive gray silty clay loam. In some places the underlying material is silty clay.

Included with this soil in mapping are small areas of the moderately well drained Symerton soils on higher ridges and the poorly drained Reddick soils in depressions or drainageways. These included soils make up 5 to 10 percent of the unit.

Water and air movement is moderate in the subsoil and moderately slow in the underlying material. Runoff is slow. The organic-matter content is high. The available water capacity is high. The surface layer is friable. The shrink-swell potential is moderate. The water table is occasionally within 1 to 3 feet of the surface in winter and early in spring.

Most of the acreage is farmed. The potential is good for cultivated crops, pasture, or hay. It is poor for dwellings.

This soil is suitable for corn, soybeans, small grain, grasses, and legumes. Drainage may be a limitation in some areas. Tile functions adequately in this soil.

Wetness is the main limitation in using this soil as a site for dwellings. The potential can be increased by lowering the seasonal water table.

The capability class is I.

294B—Symerton silt loam, 1 to 5 percent slopes. This gently sloping, moderately well drained soil is on low upland ridges or on side slopes along upland ridges or drainageways. Most areas are long and narrow, but some are irregularly shaped. All range from 4 to 35 acres.

Typically, the surface layer is very dark gray silt loam about 10 inches thick. The subsoil is about 34 inches thick. The upper part is dark yellowish brown silt loam, the middle part is dark yellowish brown clay loam and sandy clay loam, and the lower part is brown silty clay loam. The underlying material to a depth of 60 inches is calcareous silty clay loam glacial till. In some places the surface layer is loam, and in some places it is lighter colored than is typical. In some places the upper part of the subsoil has less sand and more clay than is typical. There are areas where the underlying material is clay loam or loam.

Included with this soil in mapping and making up less than 7 percent of the unit are small areas of the somewhat poorly drained Elliott and Andres soils and poorly drained Reddick or Ashkum soils in drainageways and at the base of slopes.

Water and air movement is moderate in the upper part of the subsoil and moderately slow in the lower part and in the underlying material. Surface runoff is medium. The available water capacity is high. The organic-matter content is moderate. The surface layer is friable. The shrink-swell potential is moderate. The water table is frequently between depths of 4 and 6 feet in winter and spring.

Most of the acreage is farmed. The potential is good for cultivated crops or pasture. It is fair for dwellings.

This soil is suitable for corn, soybeans, and small grain and for legumes and grasses for hay and pasture. Erosion is the main limitation. Keeping tillage at a minimum,

managing crop residue, contour farming, and terracing help to reduce soil losses.

Shrink swell and wetness are the main limitations in using this soil as a site for dwellings. Foundations must be designed to withstand the shrinking and swelling of the soil. For dwellings with basements, the water table should be lowered.

The capability subclass is IIe.

294C2—Symerton silt loam, 5 to 10 percent slopes, eroded. This sloping, moderately well drained soil is commonly on side slopes along principal drainageways in the uplands. Individual areas are long and narrow and range from 5 to 20 acres.

Typically, the surface layer is black silt loam about 7 inches thick. The subsoil is dark yellowish brown, firm clay loam about 25 inches thick. The underlying material to a depth of about 60 inches is very firm, calcareous silty clay loam. In some places the surface layer and the upper part of the subsoil are silty clay loam. In some places the lower part of the subsoil is loam underlain by calcareous clay loam.

Included with this soil in mapping and making up less than 7 percent of the unit are areas of the somewhat poorly drained Elliott soils and poorly drained Reddick or Ashkum soils in drainageways.

Water and air movement is moderate in the upper part of the subsoil and moderately slow in the lower part and in the underlying material. Runoff is rapid. The available water capacity is high. The shrink-swell potential is moderate. The organic-matter content is moderate. The water table is frequently between depths of 4 and 6 feet in winter and spring.

Most of the acreage is farmed. The potential is fair for cultivated crops or pasture. It is also fair for dwellings.

This soil is suitable for corn, soybeans, and small grain and for grasses and legumes for hay and pasture. Erosion is the main limitation. Keeping tillage at a minimum, managing crop residue, terracing, contouring, and including a close growing crop in the cropping system help to control erosion.

Shrink swell and wetness are the main limitations in using this soil as a site for dwellings. Foundations must be designed to withstand the shrinking and swelling of the soil. For dwellings with basements, the water table should be lowered.

The capability subclass is IIIe.

315B—Channahon loam, 1 to 4 percent slopes. This nearly level to gently sloping, well drained soil is on ridges and side slopes along drainageways in terraced areas along the Illinois River. Individual areas are long or irregularly shaped and range from 5 to 60 acres.

Typically, the surface layer is black and very dark grayish brown loam about 12 inches thick. The subsoil is about 6 inches thick. It is dark brown and dark yellowish brown clay loam. The underlying material is limestone bedrock. In some places bedrock is exposed and there are loose rocks on the surface. In many places the bedrock is calcareous sandstone.

Included with this soil in mapping are small areas of the poorly drained Faxon and Bryce-Calamine Variant soils. These included soils, in drainageways and depressions, make up 2 to 5 percent of the area.

Water and air movement is moderate through this soil. Runoff is medium. The organic-matter content is moderate. The available water capacity is low. The surface layer is friable, but rocks at or near the surface interfere with cultivation.

Most of the acreage is pastured or idle. The potential is poor for cultivated crops, hay, pasture, or trees. It is also poor for dwellings.

The major limitations in using this soil for crops are the shallowness over bedrock, the stones at or near the surface, and the droughtiness. The stones make pasture renovation and maintenance difficult.

The shallowness over bedrock is the main limitation in using this soil as a site for dwellings.

The capability subclass is IIIe.

330—Peotone silty clay loam. This nearly level, very poorly drained soil is on creek bottoms, in drainageways, or in depressional areas in uplands. It is subject to occasional flooding for long periods from February through June. Areas are typically long and narrow and range from 3 to 90 acres.

Typically, the surface layer is very dark gray silty clay loam about 19 inches thick. The subsoil is about 31 inches thick. The upper part is very dark gray, firm and very firm silty clay loam. The lower part is dark gray and gray, mottled, very firm silty clay loam and silty clay. The underlying material to a depth of 69 inches is gray, mottled silty clay. In a few places the upper layer contains muck or marl. In some places the very dark gray and black soil material is less than 24 inches thick, and in other places it is thicker than 36 inches. In some areas the subsoil contains less clay than is typical.

Included with this soil in mapping and making up less than 7 percent of the unit are areas of the somewhat poorly drained Lawson soil in slightly elevated areas or near the creek banks.

Water and air movement is moderately slow through this soil. Runoff is very slow to ponded. The available water capacity is high. The organic-matter content is high. The surface layer is somewhat sticky when moist and forms clods when dry. The shrink-swell potential is high. The water table is frequently within a depth of 1 foot in winter and spring.

Most of the acreage is farmed. The potential is fair to good for cultivated crops or pasture. It is poor for dwellings.

This soil is suitable for corn, soybeans, small grain, and pasture grasses. It is somewhat wet for some legumes. Ponding and poor internal drainage are the main limitations in cropping this soil. Surface ditches or tile drainage is needed. Tile outlets are sometimes unavail-

able or too distant. The spacing between the tiles should be reduced and backfilled with topsoil or other permeable filter material. Incorporating crop residue in the surface layer helps to maintain good tilth.

These soils are generally unsuitable for dwellings and septic tank absorption fields because of the wetness and the flooding.

The capability subclass is IIw drained.

343—Kane silt loam. This nearly level, somewhat poorly drained soil is in terraced areas along the Illinois River. Individual areas are long and irregularly shaped and range from 10 to 80 acres.

Typically, the surface layer is very dark gray, friable silt loam about 11 inches thick. The subsoil is about 23 inches thick. The upper and middle part is firm, brown and yellowish brown, mottled silty clay loam. The lower part is firm, yellowish brown, mottled clay loam. The underlying material to a depth of 60 inches is loose gravelly sand. In some places the surface layer and subsoil are sandier than is typical and sand and gravel are no more than 2 feet below the surface.

Included with this soil in mapping are small areas of the poorly drained Selma and Sawmill soils. These included soils, in shallow depressions, make up 5 to 10 percent of the unit.

Water and air movement is moderate through the upper part of this soil and rapid through the lower part. Runoff is slow. The organic-matter content is moderate. The surface layer is friable and is easily tilled. The shrink-swell potential is low. Some areas are subject to temporary flooding. The available water capacity is moderate. The water table is occasionally within 3 feet of the surface in winter and early in spring.

Most of the acreage is farmed. The potential is fair for cultivated crops. It is poor for dwellings.

Kane soils are suitable for corn, soybeans, small grain, legumes, and grasses. Keeping tillage at a minimum and managing crop residue conserve soil moisture.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal high water table should be lowered.

The capability subclass is IIs.

354B—Hononegah loamy sand, 1 to 5 percent slopes. This nearly level to gently sloping, excessively drained soil is on ridges in terraced areas near the Illinois River. Individual areas are long and irregularly shaped and range from 3 to 100 acres.

Typically, the surface layer is black and very dark brown loamy sand about 20 inches thick. The subsoil is very dark grayish brown and brown loamy sand about 8 inches thick. It is about 10 percent gravel. The underlying material to a depth of about 60 inches is loose sand that is about 10 percent gravel. In some places the subsoil has layers of sandy loam or sandy clay loam. In other places it is loamy sand containing very little gravel. In many places the underlying material is calcareous.

Included with this soil in mapping are small areas of the somewhat poorly drained Kane soils and poorly drained Selma soils. These included soils are in depressions or drainageways and occupy 5 to 8 percent of the unit.

Water and air movement is very rapid through this soil. Runoff is slow. The organic-matter content is moderately low. The surface layer is very friable and easily tilled. The available water capacity is very low. The shrink-swell potential is low.

Some of the acreage is farmed, some is grazed, and some is timbered. The potential is poor for most cultivated crops. It is fair for truck crops, small grain, pasture, or trees. It is good for dwellings.

This soil is too droughty for satisfactory yields of corn or soybeans. It is highly susceptible to soil blowing. Keeping tillage at a minimum, planting field windbreaks, and managing crop residue reduce soil loss.

This soil is a satisfactory site for dwellings. Droughtiness is a limitation in establishing lawns. There is danger of contaminating the water supply if septic systems are used. Wells should be located a safe distance from septic filter fields.

The capability subclass is IVs.

354C—Hononegah loamy sand, 5 to 15 percent slopes. This sloping to strongly sloping, excessively drained soil is on side slopes of terrace breaks and on ridges mainly in terraced areas near the Illinois River. Individual areas are narrow and long and range from 3 to 25 acres.

Typically, the surface layer is very dark gray loamy sand about 10 inches thick. The subsoil is very friable, dark brown gravelly loamy sand about 15 inches thick. The underlying material to a depth of about 60 inches is mixed sand and gravel. The texture varies. In some places the subsoil has layers of gravelly sandy loam or gravelly sandy clay loam. In other places the subsoil and underlying material are gravelly silty clay loam or finer textured. In still other places the subsoil is loamy sand with very little gravel. In many places the underlying material is calcareous.

Included in mapping and making up less than 10 percent of the unit are areas of the moderately well drained Chatsworth soils near the base of slopes.

Water and air movement is very rapid through this soil. Runoff is medium. The organic-matter content is moderately low. The surface layer is very friable and easily tilled. The available water capacity is very low. The shrink-swell potential is low.

Most of the acreage is pastured or is idle. The potential is poor for cultivated crops or pasture. It is fair for dwellings.

This soil is too droughty for satisfactory corn or soybean production. It is susceptible to soil blowing. It should be used as pasture. Pasture rotation, timely deferment of grazing, and fertilization help to keep the pasture and the soil in good condition.

The slope is the main limitation in using this soil as a site for dwellings. Droughtiness is a limitation in establishing lawns. There is some danger of contaminating the water supply if septic systems are used. Wells should be located at a safe distance from septic filter fields.

The capability subclass is VIs.

392—Urban land-Orthents complex. This map unit consists of nearly level, altered, medium textured soils. It is about 45 percent Urban land and 40 percent Orthents. Individual areas are usually geometric and range from 30 to 300 acres. The areas of Urban land and Orthents are so intricately mixed or so small in size that it is not possible to map them separately at the scale selected for mapping.

The Urban land part of this unit is covered with industrial buildings, pavement, and roads that obscure the soils so that identification is not feasible. Orthents are altered soils of highly varying texture, including sandy, loamy, and clayey material. In some places gravel or rocks are mixed with the soil material. In some places shale, sandstone, or limestone is within a depth of 4 feet.

Included with this unit in mapping are levees, which make up about 15 percent of the total acreage.

Water and air movement is variable through Orthents, and runoff is slow. The organic-matter content is low. The available water capacity is variable also but is generally high. The shrink-swell potential is variable. Most areas have been compacted by construction equipment. The depth to the seasonal water table is 1 to 6 feet. The soil material is dominantly neutral or alkaline throughout.

The open areas in this unit have been reshaped. Most can be successfully vegetated. Topsoil is needed in order to establish a good turf. Dark colored topsoil, friable subsoil material, and extra fertilizer are needed for tree and shrub plantings.

The capability subclass is unassigned.

439A—Jasper silt loam, sandy substratum, 0 to 2 percent slopes. This nearly level, well drained soil is on ridges in uplands. Individual areas are long or irregularly shaped and range from 5 to 40 acres.

Typically, the surface layer is 10 inches of black silt loam over 8 inches of dark brown silt loam. The subsoil is about 28 inches thick. It is dark brown, firm loam and clay loam. The underlying material to a depth of about 60 inches is stratified loose loamy sand and sand. In some places the surface layer is loam and the subsoil is sandy loam or loam. In some places the soil is moderately well drained. Carbonates are within a depth of 30 inches in some areas.

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

Water and air movement is moderate in the subsoil and moderately rapid in the underlying material. Runoff is medium. The organic-matter content is moderate. The available water capacity is high. The surface layer is friable and is easily tilled. The shrink-swell potential is low.

Most of the acreage is farmed. The potential is good for cultivated crops, hay, pasture, and trees. It is good for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture.

This soil is suited to dwellings. If septic systems are used, precautions should be taken to avoid contaminating the water supply through the underlying sandy material.

The capability class is I.

439B—Jasper silt loam, sandy substratum, 2 to 6 percent slopes. This gently sloping, well drained soil is on ridges and side slopes along drainageways in uplands. Individual areas are long or irregularly shaped and range from 3 to 30 acres.

Typically, the surface layer is very dark grayish brown silt loam about 18 inches thick. The subsoil is about 32 inches thick. The upper part is brown, firm silty clay loam. The middle part is dark yellowish brown and yellowish brown clay loam and sandy clay loam. The lower part is yellowish brown sandy loam. The underlying material to a depth of about 60 inches is stratified, yellowish brown, loose loamy sand and sand. In some places the surface layer is loam and the subsoil is sandy loam or loam. In a few places the surface layer is less than 10 inches thick. In some areas this soil is calcareous within a depth of 30 inches. There is a silty clay loam substratum layer above 60 inches in some of the steeper areas, and in these areas the soil is moderately well drained.

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

Water and air movement is moderate in the subsoil and moderately rapid in the underlying material. Runoff is medium. The organic-matter content is moderate. The available water capacity is high. The surface layer is friable and is easily tilled. The shrink-swell potential is low.

Most of the acreage is farmed. The potential is good for cultivated crops, hay, and pasture. It is good for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. It is susceptible to moderate erosion. Contouring, terracing, keeping tillage at a minimum, and managing crop residue help to control erosion.

This soil is suitable as a site for dwellings. If septic systems are used, precautions should be taken to avoid contaminating the water supply through the underlying sandy material.

The capability subclass is IIe.

451—Lawson silt loam. This nearly level, somewhat poorly drained soil is on flood plains. It is subject to occasional flooding for brief periods from March through November. Individual areas are wide and long and range from 10 to 200 acres.

Typically, the surface layer is very dark grayish brown silt loam about 33 inches thick. The underlying material to a depth of about 60 inches is dark grayish brown silt loam. In some places the surface layer is silty clay loam. In some areas this soil is calcareous at or near the surface.

Included with this soil in mapping are small areas of the well drained Ross soils and poorly drained Sawmill soils. Ross soils are on low ridges or near streambanks, and Sawmill soils are in depressional areas. These included soils make up 5 to 10 percent of the unit.

Air and water movement is moderate through this soil. Runoff is slow. The surface layer is friable and is fairly easily tilled. The available water capacity is very high. The organic-matter content is high. The shrink-swell potential is low. The water table is occasionally within a depth of 3 feet.

Most of the acreage is farmed. The potential is good for cultivated crops, hay, pasture, or trees. It is poor for dwellings.

This soil is suited to corn, soybeans, small grain, grasses, and legumes. It is subject to flooding, especially in spring. Floodwater can damage the crop, but it usually recedes early enough for the crop to survive. Tile drains and surface drains function satisfactorily if suitable outlets are available.

This soil is generally not suitable for dwellings and septic tank absorption fields because of the flooding and the wetness.

The capability subclass is IIw.

503B—Rockton silt loam, 1 to 5 percent slopes. This nearly level and gently sloping, well drained soil is on terraced ridges near the Illinois River. Individual areas are irregularly shaped and range from 4 to 80 acres.

Typically, the surface layer is 16 inches of very dark brown silt loam over 4 inches of dark brown loam. The subsoil is about 7 inches thick. It is yellowish brown clay loam containing some flagstones. The underlying material is weathered, fractured, rippable coarse limestone. Calcareous limestone bedrock is at a depth of about 31 inches. In some areas the bedrock is below a depth of 40 inches, and in others it is within a depth of 30 inches. The surface layer is more loamy in some areas than is typical. In some areas the surface layer and subsoil are much sandier and the underlying bedrock is calcareous sandstone.

Included with this soil in mapping and making up less than 7 percent of the unit are areas of the poorly drained Faxon soils in depressions.

Water and air movement is moderate through this soil. Runoff is medium. The available water capacity is moderate. The organic-matter content is moderate. The shrink-swell potential is moderate. The surface layer is friable and is easily tilled. The water table is seldom above the bedrock.

Most of the acreage is idle. The potential is only fair for cultivated crops. It is also fair for dwellings.

Corn, soybeans, and small grain and grasses and legumes for hay and pasture can be grown. Some large rocks at or near the surface interfere with cultivation. The soil is somewhat erodible and somewhat droughty. Keeping tillage at a minimum, managing crop residue, and contouring help to control erosion and conserve moisture.

This soil is suitable as a site for dwellings or other buildings without basements. Foundations must be designed to withstand the shrinking and swelling of the soil. The shallow depth to bedrock hampers the installation of underground utility lines and septic systems. Polluting the ground water through fractured bedrock is a potential hazard.

The capability subclass is IIe.

516—Faxon silty clay loam. This nearly level, poorly drained soil is in broad depressions on terraces along the Illinois River. It is subject to common flooding for very brief periods in April and May. Individual areas are irregularly shaped and range from 10 to 160 acres.

Typically, the surface layer is black silty clay loam about 19 inches thick. The subsoil is dark gray and gray, mottled clay loam about 15 inches thick. The underlying material is fractured hard limestone. In some areas the dark surface layer is thicker than 20 inches. In some places it is dark gray. In some areas the bedrock is below a depth of 40 inches and in other areas it is within a depth of 20 inches. In some areas the surface layer and subsoil are sandier than is typical.

Included with this soil in mapping and making up less than 5 percent of the unit are small areas of the well drained Rockton soils higher in elevation than Faxon soils.

Water and air movement is moderate through this soil. Runoff is very slow or ponded. The available water capacity is moderate. The organic-matter content is high. The surface layer is sticky when wet, and the water table is near the surface in the early part of the growing season. The shrink-swell potential is moderate.

Most of the acreage is idle. Wetland grasses, weeds, and brush dominate the area. The potential is poor for crops, pasture, or woodland. It also is poor for dwellings.

Corn, soybeans, small grain, and hay and pasture can be grown if drainage is provided. Tile drainage or surface ditching is difficult because of the shallowness over bedrock and the lack of outlets. There are some stones at the surface.

This soil is generally not suitable as a site for dwellings and septic tank absorption fields because of the wetness, the flooding, and the shallowness over bedrock.

The capability subclass is VIw.

536—Dumps. Dumps are steep or very steep, high mounds of spoil from old mine shafts. Individual areas are round or irregularly shaped and range from 2 to 120 acres. They are generally surrounded by cropland.

The material, from the deep substratum, consists of small, broken, thin pieces of weakly cemented shale and siltstone. The texture is loam, silty clay loam, and silty clay. The material is dominantly gray, but in some places it is reddish or pink. It is compacted and is readily eroded. It is high in sulphur and is slightly to very strongly acid. It has practically no organic matter. It supports very little vegetation except on the lower parts of the slopes. The runoff from Dumps is somewhat toxic to plants.

Nearly all of this unit is idle.

The capability subclass is unassigned.

553—Bryce-Calamine Variant complex. These nearly level, poorly drained soils are on river terraces. They are subject to occasional flooding for long periods from January to April. Individual areas are long or irregularly shaped and range from 10 to 300 acres. The map unit is 45 to 55 percent Bryce shale substratum soils and 45 to 55 percent Calamine Variant soils. The Bryce soil is in the somewhat lower depressional areas or in drainageways. The nearly level Calamine Variant soil is on flats.

Typically, the Bryce soil has a black silty clay loam surface layer about 9 inches thick. It has a very dark gray silty clay subsurface layer about 12 inches thick. The subsoil is about 35 inches thick. The upper part is dark gray, mottled silty clay, and the lower part is olive gray, mottled silty clay. The underlying material is rippable shale bedrock. In some places the soil is deeper over bedrock than is typical.

Typically, the Calamine Variant soil has a surface layer of black and very dark gray silty clay about 13 inches thick. The subsoil is olive gray and gray, mottled silty clay about 22 inches thick. The underlying material is layered rippable siltstone and shale bedrock. In some places the soil is shallower over the bedrock than is typical.

Included with these soils in mapping are small areas of the somewhat poorly drained Shadeland soils. These included soils are in slightly higher areas and make up 5 to 10 percent of the unit.

Water and air move through these soils at a slow rate. Runoff is very slow, and sometimes ponds form in depressional areas. The available water capacity is low for the Calamine Variant soil and moderate for the Bryce shale substratum. The organic-matter content is high. The surface layer is sticky when wet. If it is cultivated when wet, clods are likely to form. The shrink-swell potential is moderate in both soils. The silty clay subsoil and the underlying bedrock restrict root development. The water table is frequently within a depth of 2 feet in winter and spring.

Some areas of this unit are farmed. Some are urbanized. Some are in timber, brush, and weeds. The potential is poor for cultivated crops, hay, and pasture. It is also poor for dwellings.

Corn, soybeans, small grain, or grasses can be grown. Wetness often delays seedbed preparation. Surface ditches are needed to improve drainage. The soils are too clayey and too shallow over bedrock for tile drainage to function well. Legume stands are subject to winter kill by frost heave. Grazing should be avoided when the soil is wet.

This unit is generally not suitable for dwellings and septic tank absorption fields because of the wetness, the flooding, and the shallowness over bedrock.

The capability subclass is IIw.

555—Shadeland loam. This nearly level, somewhat poorly drained soil is on terraces along the Illinois River. Individual areas are wide, long, or irregularly shaped and range from 3 to 200 acres.

Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is grayish brown loam about 5 inches thick. The subsoil is about 24 inches thick. The upper part is brown, mottled clay loam. The middle part is gray and grayish brown, mottled clay loam. The lower part is a thin layer of grayish brown silty clay. The underlying material is interbedded rippable sandstone and shale bedrock. In some places the surface layer is lighter in color than is typical. In places the dark surface layer is thicker. In some places the subsoil is sandier than is typical, or it contains sandstone or shale fragments. The depth to bedrock is less than 20 inches in some places and more than 40 inches in other places.

Included with this soil in mapping are areas of the poorly drained Bryce shale substratum soils and Calamine Variant soils in depressions and the moderately well drained High Gap soils on ridges and on side slopes along drainageways. These included soils make up 5 to 10 percent of the unit.

Water and air move through this soil at a moderately slow rate. Runoff is slow. The organic-matter content is moderate. The available water capacity is moderate. The surface layer is friable. Sandstone and shale bedrock restrict root development. The shrink-swell potential is moderate. The water table is frequently within a depth of 3 feet in winter and spring.

Some areas of this soil are cultivated. Some are urbanized. Some are in parks, pasture, brush, or weeds. The potential is fair for cultivated crops, hay, or pasture. It is poor for dwellings.

Corn, soybeans, small grain, and grasses or legumes can be grown. The soil tends to be wet in spring because of the perched water table on the sandstone and shale bedrock. Stones on the surface layer interfere with tillage and harvest. Surface ditches are needed.

Wetness and the shallowness over bedrock are the main limitations in using this soil as a site for dwellings. The soil is too shallow for dwellings with basements. For dwellings without basements, the water table can be lowered.

The capability subclass is IIw.

556B—High Gap loam, 1 to 5 percent slopes. This nearly level to gently sloping, moderately well drained soil is on ridges and side slopes in terraced areas along the Illinois River. Individual areas are long and irregularly shaped and range from 5 to 200 acres.

Typically, the surface layer is very dark grayish brown loam about 9 inches thick. The subsoil is about 27 inches thick. The upper part is yellowish brown loam. The middle part is yellowish brown clay loam with common soft sandstone fragments. The lower part is a mixture of greenish gray silty clay loam and gray and yellowish brown loam that has common soft sandstone fragments. The underlying material is stratified, weathered sandstone and shale, predominantly sandstone. In some places bedrock is within a depth of 20 inches and stones are on the surface. In some areas the depth to bedrock is more than 40 inches. In some areas the soil has a lighter colored surface layer than is typical. In some it has a siltier surface layer or a sandier subsoil.

Included with these soils in mapping are small areas of the somewhat poorly drained Shadeland soils. These soils, at the bases of ridges or near the heads of drainageways, make up less than 8 percent of the unit.

Water and air move through this soil at a moderate rate to the bedrock and at a slow rate through the bedrock. Runoff is medium. The available water capacity, the shrink-swell potential, and the organic-matter content are moderate.

Some of the acreage is cropped, and some is pastured. Some is urbanized. Some is idle. Some is in parks or industrial plants. The potential is poor for cultivated crops or pasture. It is fair for dwellings without basements and poor for sanitary facilities.

Corn, soybeans, small grain, and hay or pasture can be grown. The soil is subject to blowing. Stones at or near the surface may interfere with cultivation and harvest. Managing crop residue and keeping tillage at a minimum help to reduce soil blowing.

Soil depth is the main limitation in using this soil as a site for dwellings without basements. Foundations should be designed accordingly.

The capability subclass is IIIe.

570B—Martinsville loam, 1 to 5 percent slopes. This nearly level to gently sloping, well drained soil is on upland ridges along major streams and drainageways. Individual areas are long or irregularly shaped and range from 5 to 100 acres.

Typically, the surface layer is dark brown loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part is dark brown loam. The middle part is dark brown clay loam. The lower part is dark brown loam. In many areas the surface layer is silt loam. In some areas the subsurface layer is grayish brown, brown, or yellowish brown silt loam or fine sandy loam 4 to 7 inches thick. In some areas the soil has a sandier subsoil than is typical.

Included with this soil in mapping and making up less than 10 percent of the unit are small areas of the somewhat poorly drained Starks and Darroch soils. These included soils are in flat or somewhat depressional areas.

Water and air movement is moderate through this soil. Runoff is slow. The available water capacity is high. Reaction is medium acid. The organic-matter content is moderately low. The shrink-swell potential is moderate. The surface layer is easily tilled.

Most areas of this soil are farmed. Some are wooded. Others are used for recreation. The potential is only fair for crops or pasture. It is also fair for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. It is subject to moderate erosion. Managing crop residue, keeping tillage at a minimum, contouring, and terracing help to control erosion.

This soil is suitable as a site for dwellings. Foundations should be designed to withstand the shrinking and swelling of the soil.

The capability subclass is IIe.

570C—Martinsville loam, 5 to 10 percent slopes. This sloping, well drained soil is on upland side slopes and ridges along streams and drainageways. Individual areas are long and narrow and range from 3 to 12 acres.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsurface layer is brown and yellowish brown fine sandy loam about 7 inches thick. The subsoil is about 29 inches thick. The upper part is yellowish brown fine sandy loam. The middle and lower parts are dark brown and yellowish brown sandy clay loam. The underlying material to a depth of 60 inches is stratified loam and sandy clay loam. In some places the lower part of the subsoil and the substratum contain gravel. In some places the subsoil is sandier than is typical.

Included with this soil in mapping are small areas of Starks soils in drainageways. These included soils make up less than 8 percent of the unit.

Water and air movement is moderate through this soil. Surface runoff is rapid. The available water capacity is high. The organic-matter content is moderately low. The shrink-swell potential is moderate.

Some areas of this soil are farmed. Some are timbered. The potential is only fair for cultivated crops, pasture, and timber. It is also fair for dwellings.

This soil is suitable for corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Slope and erosion are the main limitations. Contouring, terracing, keeping tillage at a minimum, and managing crop residue reduce soil loss.

If this soil is to be used as a site for dwellings, foundations should be designed to withstand the shrinking and swelling of the soil.

The capability subclass is IIIe.

594—Reddick silty clay loam. This nearly level, poorly drained soil is in very broad, slightly depressional areas in the uplands. Individual areas are irregularly shaped and range from 10 to more than 1,000 acres.

Typically, the surface layer is black and very dark gray silty clay loam about 10 inches thick. The subsoil is about 30 inches thick. The upper part is dark grayish brown, mottled silty clay loam. The middle part is grayish brown clay loam and silty clay loam. The lower part is olive gray sandy loam and dark yellowish brown and gray silty clay loam. The underlying material to a depth of about 60 inches is firm, calcareous silty clay loam with some pebbles. In some areas the surface layer is more than 24 inches thick. In some places the substratum is more sandy than is typical, and in other places it is more clayey.

Included with this soil in mapping and making up less than 8 percent of the unit are small areas of the somewhat poorly drained Andres soils in slightly higher positions in the landscape than Reddick soils.

Water and air move at a moderate rate through the upper and middle parts of this soil and at a slow rate through the lower part. Surface runoff is slow. Sometimes it ponds (fig. 11). The available water capacity is high. The organic-matter content is high. The surface layer is sticky when wet. It may become cloddy if cultivated when wet. The shrink-swell potential is moderate. The water table is often near the surface in winter and early in spring.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain and to grasses and legumes for hay and pasture. Soil drainage is the main limitation. Tile functions well if adequate outlets are available (fig. 12). Drainage ditches require maintenance. Soil tilth can be improved by incorporating crop residue in the surface layer.

Figure 11.—Ponding on an area of Reddick silty clay loam.

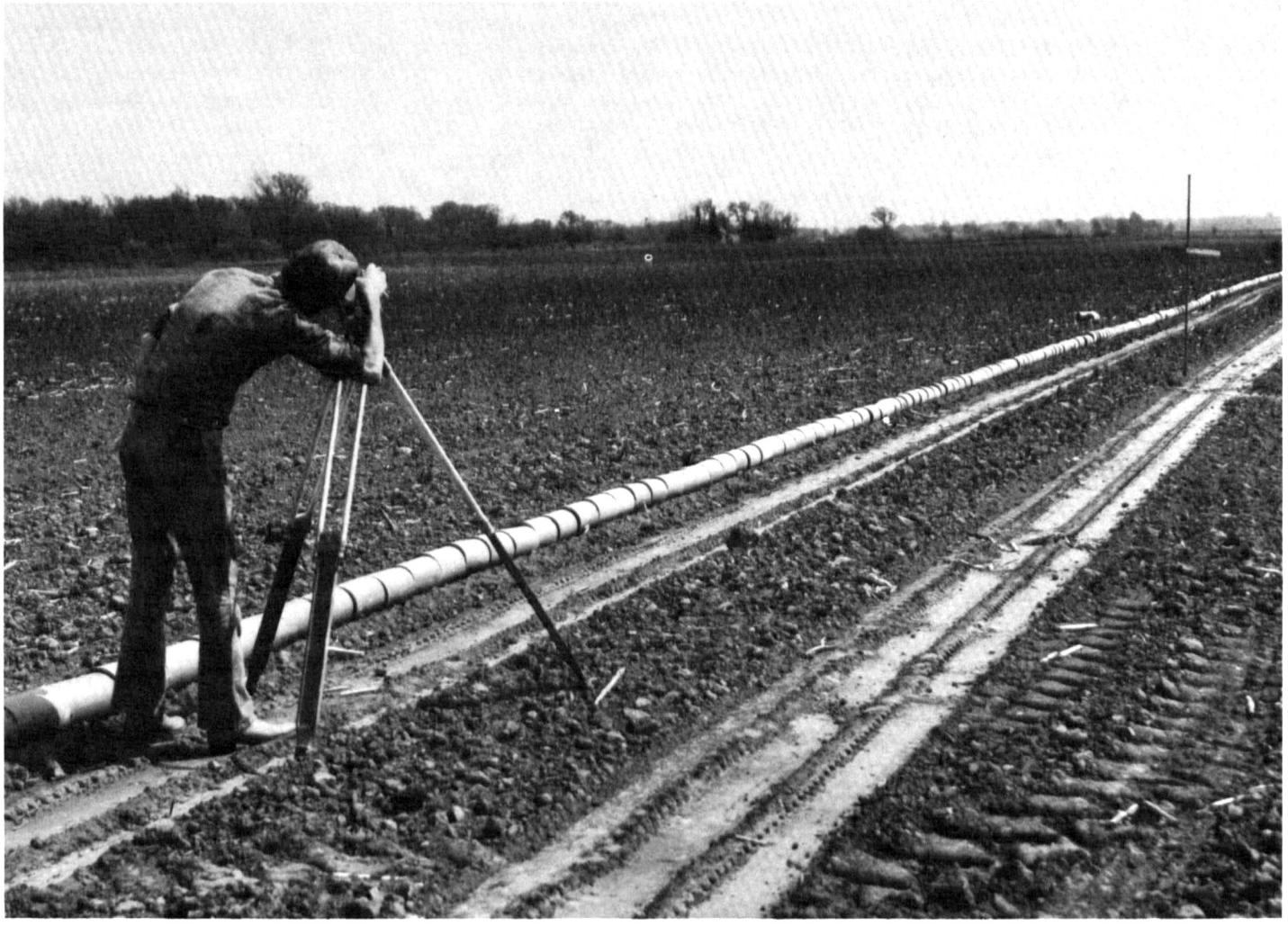

Figure 12.—Staking a tile drain in an area of poorly drained Reddick silty clay loam.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table should be lowered.

The capability subclass is IIw.

740—Darroch silt loam. This nearly level, somewhat poorly drained soil is on outwash plains in the upland. Individual areas are long and irregularly shaped and range from 3 to 75 acres.

Typically, the surface layer is black silt loam about 10 inches thick. The subsurface layer is black silty clay loam about 6 inches thick. The subsoil is about 23 inches thick. The upper part is dark grayish brown and yellowish brown, mottled clay loam. The lower part is light brownish gray and yellowish brown, friable loam. The underlying material to a depth of 65 inches is fine sandy loam and sand. In some places the subsoil contains less sand than is typical. In some places the lower part of the subsoil and the substratum are more clayey. The black surface layer is less than 10 inches thick in some areas.

Included with this soil in mapping are small areas of the well drained Jasper and Proctor soils. These soils occupy the ridges and make up 2 to 10 percent of the unit.

Water and air move through this soil at a moderately slow rate. Runoff is slow. The organic-matter content is high. The surface layer is friable and is easily tilled. The available water capacity is high. The shrink-swell potential is moderate in the subsoil. The water table is often within a depth of 3 feet in winter and spring.

Most areas of this soil are farmed. The potential is good for cultivated crops, hay, and pasture. It is poor for dwellings.

This soil is suited to corn, soybeans, and small grain, and to grasses and legumes for hay and pasture. Wetness is the only limitation. Tile drains function satisfactorily if suitable outlets are available.

Wetness is the main limitation in using this soil as a site for dwellings. The seasonal water table should be lowered if the soil is to be used for this purpose.

The capability subclass is IIw.

776—Comfrey loam. This nearly level, poorly drained soil is on bottom lands along the main creeks. It is subject to occasional flooding for brief periods from April to July. Individual areas are long and narrow and range from 10 to 200 acres.

Typically, the surface layer is friable, very dark gray and black loam about 29 inches thick. The underlying material to a depth of about 65 inches is dark grayish brown and gray mottled, firm clay loam and sandy clay loam. In some places the soil is predominantly silty throughout. In other places it is somewhat clayey throughout.

Included with this soil in mapping are small areas of the well drained Ross soils. These areas are on low ridges or next to the main channel and make up 2 to 5 percent of the unit.

Water and air movement is moderate through this soil. Runoff is very slow. Sometimes it ponds. The available water capacity is high. The organic-matter content is high. The shrink-swell potential is moderate. The surface layer is friable and is easily tilled. The water table is occasionally above 2 feet in winter and early in spring.

Most areas of this soil are wooded or pastured. Some are farmed. The potential is only fair for cultivated crops and hay. It is good for pasture and poor for dwellings.

Flooding is a hazard in farming this soil, and drainage is a limitation. Streams make some areas inaccessible. Tile drains and surface drains function satisfactorily if suitable outlets are available.

This soil is generally not suitable for dwellings and septic tank absorption fields because of the flooding and the wetness.

The capability subclass is IIw.

802D—Orthents, loamy, rolling. These soils are on spoil banks of strip mined land (*3*) where the ridges have been topped or struck off and partially leveled. Individual areas are irregular to rectangular in shape and range from 50 to 1,000 acres. Slope ranges from 2 to 20 percent.

Typically, Orthents are dark gray and dark grayish brown loamy material mottled with yellowish brown. The loamy material was derived primarily from calcareous silty clay loam and clay loam glacial till mixed with smaller amounts of outwash and silty shale. The material contains many stones and a few boulders, mainly limestone, siltstone, and sandstone. The texture ranges from sand to silty clay but is predominantly silty clay loam and clay loam.

Included with Orthents in mapping are areas that are nearly level and areas that are stony at the surface. Other included areas are haulage roads and mine spoil piles. The spoil piles are extremely acid because of the high shale, coal, and sulfur content. Also included in this unit are some borrow pits as a result of road construction, shallow trenches and depressions that hold water, a few deep water areas, and very steep areas that were not leveled. These included areas make up about 30 percent of the unit.

Water and air movement is moderate or moderately slow through these soils. Runoff is medium to rapid. The organic-matter content is low. The reaction is predominantly moderately alkaline, but in some areas the soil has extremely acid pockets. The stone content is commonly 5 to 10 percent, but ranges up to about 50 percent.

Most areas of Orthents are idle. The potential is poor for cultivated crops or pasture. The plant cover, chiefly

sweet clover, alfalfa, bromegrass, and weeds, ranges from very sparse on the newly leveled areas to moderately dense on the older exposures. The potential is poor for dwellings.

Orthents are generally not suited to cultivated crops and hay because of the high stone content at the surface. Special stone gathering equipment is needed in leveled areas. Included areas that are nearly stone free at the surface can be used for wheat, corn, and soybeans. Fertilizer is needed. Sloping areas should be protected from erosion.

Grasses and legumes can be grown. The stony surface layer prohibits good seedbed preparation. Furthermore, the stones are likely to damage equipment. Fertilizer, particularly nitrogen, is needed to promote good growth rates. Lime is needed in acid areas. Rotating the pasture to prevent overgrazing and restricting its use during wet periods help to keep the pasture in good condition and the soil from eroding.

Trees can be grown on these soils, but the stony surface layer limits the use of mechanical planting equipment. The stones also interfere with harvest. Survival of seedlings varies because of the varying soil reaction and the droughtiness.

The slope and the stones are the main limitations in using this soil as a site for dwellings. Land leveling and stone removal are needed.

The capability subclass is VIs.

802G—Orthents, loamy, very steep. These soils are on ridges and side slopes of spoil banks in strip mined areas. The surface layer is somewhat stony. The areas have barren or sparsely vegetated slopes and interspersed water areas. They are commonly 40 to several hundred acres in size and irregular to rectangular in shape. Slopes range from 30 to 70 percent.

Typically, Orthents are dark gray to brown loamy material mottled with yellowish brown. The material varies, both in texture and in reaction. The surface layer and subsoil are essentially the same material. Parallel ridges differ. One can be moderately alkaline sandy material, and the next extremely acid silty shale. Individual ridges are often a mixture of these materials.

Included with these soils are a few areas that have been leveled for homes, lots, roads, and recreation areas. Also included are areas that are more uniformly acid because of the high shale, coal, and sulfur content. These areas have little or no plant cover.

Water and air move through these soils at a moderate to slow rate, and runoff is commonly very rapid. The organic-matter content is low. Reaction ranges from moderately alkaline to extremely acid but is commonly moderately alkaline to slightly acid. The stone content ranges from about 5 to 30 percent.

Most areas of Orthents have a moderate to heavy plant cover of grasses, herbs, and small trees. A few are fresh exposures and areas that are uniformly acid. Most of the acreage is used for recreation or for residences and recreation. Some is idle. The potential is fair to poor for pasture and trees and poor for cultivated crops. It is fair to good for recreation and wildlife uses and poor for dwellings.

Orthents are not suited to cultivated crops because of the high stone content and the very steep slopes.

Orthents have limited suitability as pastureland because of the very steep slopes. Striking off the peaks of the ridges and leveling are needed if these areas are to be productive. Fertilization, particularly nitrogen, is needed to promote good growth. Acid areas should be limed. Some aerial seeding and spraying has been done to establish a plant cover of sweetclover, alfalfa, and bromegrass.

Suitability for trees is limited because of the very steep slopes. Planting and harvesting are restricted by the size and number of stones. Peaks of the ridges can be bladed off and areas leveled to increase suitability and make the soils more productive.

Recreation and wildlife uses are limited in some areas because of the lack of plant cover and because of the very rapid runoff from the very steep slopes. Leveling, planting desirable plant species, and stocking water areas capable of supporting fish are needed.

The very steep slopes and the settling are the main limitations in using Orthents for dwellings. The potential can be improved by land leveling and by compacting the soil.

The capability subclass is VIIs.

811—Aquolls. Aquolls are level, low-lying marshy soils mostly along or near the rivers and the old Illinois-Michigan Canal. They are on the flood plain or on the low terraces, or second bottoms. Individual areas are long or irregularly shaped and range from 6 to more than 350 acres.

The material is muck mixed with sand, silt, or clay. In some areas it overlies shale or sandstone bedrock. The water table is at or near the surface most of the time. The plant cover is various types of swamp grasses, cattail, weeds, willow, water lilies, brush, and cottonwood. Aquolls are not drained. Some are in drainageways, but most are covered with stagnant water. The material is typically high in content of organic matter.

Areas of Aquolls are used only as wetland wildlife refuge. Only a few, however, are managed for this purpose. Some are included with areas that are pastured.

Aquolls are not suitable for crops or pasture because of wetness. They are difficult to drain because they are lower than the surrounding areas and adequate outlets are not generally accessible.

The capability subclass is VIIIw.

863—Pits, clay. This map unit consists of areas that are mined for the clay needed in making bricks and other clay products. The clay is from Pennsylvanian age deposits.

Nearly all of these areas have been disturbed. In some, mining is still active. Excavations are 10 to 15 feet

deep. Also in this unit are several bodies of water of 5 to 12 acres separated by levees. The water is not suitable for fish because of the high acidity.

The original material was 2 to 3 feet of acid peat and some marl over the lakebed clays. Now the soil material is dominantly clayey or shaly and is impervious. It has been mixed with some peat and glacial boulders. It is very low in fertility and organic-matter content and is excessively acid. In some areas it could support a plant cover. Some pits have been partially leveled.

Currently, the areas of water are not used. If the acidity were corrected they could be used for fishing or other recreation. Some areas would be suitable for sanitary landfill. For most other purposes, however, large scale reclamation would be needed, including ample settling time and thorough compaction of the soil material. Top dressing would be needed before a plant cover could be established.

The capability subclass is VIIIw.

865—Pits, gravel. This map unit consists of excavations from which gravel and sand have been removed. The pits are commonly along or near the flood plain of the Illinois River. Individual areas are narrow and irregularly shaped and range from 3 to 100 acres. Included in mapping are disturbed areas that surround the gravel pits. The large areas of water left in the excavations are not included in mapping. They are identified as water on the soil map.

The excavations are commonly 10 to 30 feet deep. In most areas the disturbed soil material surrounding the pits has been scraped, mixed, or covered with gravel and sand. It is low in fertility and organic-matter content. In some areas it has been compacted by traffic. The available water capacity is variable but is generally low to moderate.

Excavations filled with water have potential for recreation use, such as fishing, camping, boating, or swimming. The pits that are not filled with water are too permeable for sanitary landfill. They are also small.

The capability subclass is VIIIs.

1107—Sawmill silty clay loam, wet. This nearly level, very poorly drained soil is in low depressions on or near river flood plains. It is subject to frequent flooding for long periods from March to June. Individual areas usually are broad and long and range from 10 to more than 200 acres. Most are cut by streams or have bayous.

Typically, the surface layer is very dark gray silty clay loam about 24 inches thick. Below this to a depth of about 60 inches is gray silty clay loam or clay loam. There are silt loam and sandy or gravelly layers in the lower part. In some areas the soil contains a layer of muck at or near the surface.

This soil is high in content of organic matter. It is frequently ponded or has a high water table throughout much of the year. The available water capacity is very high. Permeability is moderately slow. The shrink-swell potential is moderate.

Most of the acreage is wooded. Woodland management is hampered by flooding.

The soil has fair potential for wetland wildlife habitat. The frequent flooding and the continual high water table preclude its use as a site for dwellings.

The capability subclass is Vw.

Use and management of the soils

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

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

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

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

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

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

Crops and pasture

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

Planners of management systems for individual fields or farms should consider the detailed information given

in the description of each soil under "Soil maps for detailed planning." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 73 percent of the county is cultivated. Corn and soybeans are the main crops. Some small grain and forage crops are also grown.

The main management needs are drainage, erosion control, and flood control on the bottom land.

The wetness can generally be overcome by tile drainage. In areas too clayey for tile to function satisfactorily, however, surface ditching is needed. Flood protection by levees is not economically feasible because of the limited area protected.

Erosion can be reduced by conservation tillage, contour farming, and terraces. Soil blowing can be controlled by including winter cover crops in the cropping system and by crop residue management, conservation tillage, windbreaks, and stripcropping.

Yields are high on most of the soils if they are well managed and adequately fertilized. Some of the soils are low in content of organic matter. Others are too clayey for good tilth. Some are droughty. The supply of organic matter can be maintained and tilth can be improved by conservation tillage, crop residue use, and fertilization. Droughtiness can be reduced by returning crop residue to the soil and by adding organic matter.

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 (*4*). 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.

Land capability classification

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

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

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

Class I soils have slight limitations that restrict their use.

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

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

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

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

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

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

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

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

and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

Woodland management and productivity

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

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

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 blown 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.

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 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 8 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 9 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 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 9 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 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material

during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated good, fair, poor, or unsuited as a source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering properties and classifications provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 10, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as good or fair has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as poor or unsuited as a source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic

matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water management

Table 11 gives information on the soil properties and site features that affect water management. The kind of soil limitations is given for pond reservoir areas; embankments, dikes, and levees; drainage; irrigation; terraces and diversions; and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Recreation

The soils of the survey area are rated in table 12 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 12, 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 12 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and interpretations for dwellings without basements and for local roads and streets in table 8.

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

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

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

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

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

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, orchardgrass, 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, ash, sumac, hawthorn, dogwood, hickory, blackberry, and elderberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and 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, cattail, wildrice, arrowhead, 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 woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

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

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.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering properties and classifications

Table 14 gives estimates of the engineering classification and of the range of properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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 are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. 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.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*7*). 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 17, 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-loamy, mixed, mesic Typic Haplaquolls.

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

Soil series and morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*6*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*7*). 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."

Ade series

The Ade series consists of deep, somewhat excessively drained, rapidly permeable soils on upland sandy outwash plains. These soils formed in deep sandy material. Slope ranges from 1 to 6 percent.

Ade soils are similar to Sparta soils and are commonly adjacent to Gilford and Ridgeville soils but are at higher elevations. Gilford soils are poorly drained and subject to ponding. Ridgeville soils are somewhat poorly drained. Sparta soils are excessively drained and do not have the sandy loam bands in the lower part of the solum. Gilford and Ridgeville soils have more clay in the A and B horizons.

Typical pedon in an area of Ade loamy fine sand, 1 to 6 percent slopes, 1,254 feet north and 87 feet east of southwest corner of sec. 10, T. 32 N., R. 8 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak medium granular structure; very friable; abundant roots; slightly acid; gradual smooth boundary.

A12—8 to 16 inches; very dark grayish brown (10YR 3/2) loamy fine sand; weak medium subangular blocky structure; very friable; many fine roots; medium acid; clear smooth boundary.

A13—16 to 22 inches; dark brown (10YR 3/3) loamy fine sand; weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

A2—22 to 29 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; few fine roots; medium acid; gradual smooth boundary.

A&B—29 to 60 inches; yellowish brown (10YR 5/4) and brown (10YR 5/3) fine sand (A2); many fine faint strong brown (7.5YR 5/6) mottles; single grained; loose; strong brown (7.5YR 4/4) fine sandy loam (B2t) bands from 1/2 inch to 8 inches thick in lower part; weak medium subangular blocky structure; friable; slightly acid; gradual wavy boundary.

The thickness of the mollic epipedon ranges from 11 to 22 inches. The total cumulative thickness of the bands between 29 and 60 inches ranges from 6 to 18 inches.

The A1 horizon has value of 2 or 3 and chroma of 1 to 3. It is dominantly loamy fine sand, but the range includes fine sand. The A2 horizon has value of 4 or 5 and chroma of 4 to 6. It is fine sand or loamy fine sand.

Andres series

The Andres series consists of deep, somewhat poorly drained, nearly level soils on uplands that are moderately permeable in the subsoil and moderately slowly permeable in the substratum. These soils formed in loamy material and the underlying glacial till or lacustrine sediments. Slope is 0 to 2 percent.

Andres soils are similar to Darroch and Elliott soils and are commonly adjacent to Reddick and Symerton soils. Darroch soils do not have silty clay loam till in the C horizon. Elliott soils have more clay in the control section. Reddick soils are in broad depressional areas and are poorly drained. Symerton soils are on side slopes or ridges and are moderately well drained.

Typical pedon in an area of Andres silt loam, 330 feet north and 3,630 feet east of southwest corner of sec. 34, T. 31 N., R. 8 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate fine and medium granular structure; friable; slightly acid; gradual smooth boundary.

A12—8 to 16 inches; black (10YR 2/1) silt loam; moderate medium granular structure; friable; medium acid; clear smooth boundary.

IIB1t—16 to 20 inches; yellowish brown (10YR 5/4) clay loam; very dark gray (10YR 3/1) coatings on surface of some peds; weak coarse subangular blocky structure parting to moderate fine subangular blocky; firm; slightly acid; clear smooth boundary.

IIB21t—20 to 26 inches; grayish brown (10YR 5/2) clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; many very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine iron-manganese accumulations; slightly acid; clear smooth boundary.

IIB22t—26 to 32 inches; grayish brown (10YR 5/2) clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; common very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine iron-manganese accumulations; neutral; clear smooth boundary.

IIIB3—32 to 41 inches; mixed yellowish brown (10YR 5/8) and light olive gray (5Y 6/2) silty clay loam; weak coarse subangular blocky structure; firm; common dark gray (10YR 4/1) clay films on faces of peds; few fine iron-manganese accumulations; slight effervescence; mildly alkaline; gradual smooth boundary.

IIIC—41 to 66 inches; mixed yellowish brown (10YR 5/8) and light olive gray (5Y 6/2) silty clay loam; massive; firm; common iron-manganese patches less than 2 millimeters in diameter; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 35 to 50 inches. The depth to the underlying calcareous glacial till ranges from 24 to 48 inches. The thickness of the mollic epipedon ranges from 13 to 22 inches.

The B2 horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. Texture is loam, clay loam, or silty clay loam. Reaction is slightly acid or neutral.

Ashkum series

The Ashkum series consists of deep, poorly drained, moderately slowly permeable, nearly level soils on uplands. These soils formed in silty material and the underlying silty clay loam glacial till. Slope is 0 to 2 percent.

Ashkum soils are similar to Milford and Peotone soils and are commonly adjacent to Elliott and Varna soils. Elliott soils are on higher elevations and are better drained. Milford soils do not have glacial till in the B2 or C horizons. Peotone soils have a mollic epipedon thicker than 24 inches and do not have glacial till in the B2 or C horizons. Varna soils are in more sloping areas and are moderately well drained. They also have glacial till higher in the profile.

Typical pedon in an area of Ashkum silty clay loam, 600 feet south and 228 feet east of northwest corner of sec. 27, T. 31 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam; moderate very fine subangular blocky structure; friable; many fine roots; slightly acid; clear smooth boundary.

A12—8 to 17 inches; black (10YR 2/1) silty clay loam; moderate very fine subangular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

B1—17 to 22 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine and moderate fine subangular blocky structure; friable; many very dark gray (10YR 3/1) coatings on faces of peds; very fine dark brown iron patches; common fine roots; neutral; clear smooth boundary.

B21g—22 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine and fine subangular blocky structure; friable; many very dark gray (10YR 3/1) coatings on faces of peds; neutral; clear smooth boundary.

B22g—28 to 33 inches; light olive gray (5Y 6/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine blocky structure; friable; many very dark gray (10YR 3/1) coatings on faces of peds; mildly alkaline; clear smooth boundary.

IIB3g—33 to 44 inches; light gray (5Y 6/1) silty clay loam; many fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure; friable; many dark gray (10YR 4/1) coatings on faces of peds; slight effervescence; moderately alkaline; gradual smooth boundary.

IIC—44 to 65 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct light gray (5Y 6/1) mottles; massive structure; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 60 inches. The depth to free carbonates ranges from 25 to 60 inches. The thickness of the mollic epipedon ranges from 10 to 21 inches.

The Ap horizon has value of 2 and chroma of 1 or less. The B2 horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 to 6, and chroma of 1 or 2. The texture is dominantly silty clay loam, but the range includes light silty clay. Reaction is slightly acid to moderately alkaline. The C horizon has value of 4 to 6 and chroma of 1 to 4. It is dominantly silty clay loam, but the range includes clay loam.

Blount series

The Blount series consists of deep, somewhat poorly drained, moderately slowly or slowly permeable soils on upland till plains near rivers and major streams. These soils formed in thin silty material and the underlying silty clay loam glacial till. Slope ranges from 1 to 4 percent.

Blount soils are similar to Nappanee soils and are commonly adjacent to Chatsworth, Elliott, and Morley soils. Chatsworth soils are moderately well drained. Elliott soils have a mollic epipedon 10 inches thick or more. Morley soils are moderately well drained. Nappanee soils have more clay in the B and C horizons.

Typical pedon in an area of Blount silt loam, 1 to 4 percent slopes, 1,770 feet west of the southeast corner of sec. 23, T. 34 N., R. 8 E.

Ap1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Ap2—3 to 8 inches; brown (10YR 5/3) silt loam; weak medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

B21t—8 to 12 inches; brown (10YR 5/3) silty clay loam; few fine faint light brownish gray (10YR 6/2) mottles; moderate very fine and fine subangular blocky structure; firm; common fine roots; strongly acid; clear smooth boundary.

B22t—12 to 19 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; very firm; common fine roots; many grayish brown (10YR 5/2) clay films on faces of peds; slightly acid; gradual smooth boundary.

B23t—19 to 32 inches; grayish brown (10YR 5/2) silty clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse blocky structure; firm; common fine roots; continuous grayish brown (10YR 5/2) clay films on faces of peds; very dark gray (10YR 3/1) organic coatings in root channels; strong effervescence; moderately alkaline; gradual smooth boundary.

C—32 to 60 inches; brown (10YR 5/3) silty clay loam; massive; firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 45 inches. The thickness of the A horizon ranges from 5 to 10 inches. The depth to free carbonates ranges from 19 to 40 inches.

The A1 or Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have a B1 horizon. The B2 horizon has value of 4 to 6 and chroma of 1 to 6. It is dominantly heavy silty clay loam, but the range includes silty clay. Reaction in the B horizon is strongly acid to moderately alkaline.

Brenton series

The Brenton series consists of deep, somewhat poorly drained soils on nearly level uplands. These soils formed in about 3 feet of silty material and the underlying loamy and sandy outwash. They are moderately permeable in the subsoil and rapidly permeable in the substratum. Slope is 0 to 2 percent.

Brenton soils are similar to Darroch soils and are commonly adjacent to Drummer and Proctor soils. Darroch soils have more sand in the control section. Drummer soils are in depressional areas and are poorly drained. Proctor soils are well drained and are in sloping areas or on higher ridges.

Typical pedon in an area of Brenton silt loam, 1,550 feet east and 48 feet south of northwest corner of sec. 15, T. 34 N., R. 6 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam; weak fine granular structure; friable; mildly alkaline; abrupt smooth boundary.

A3—10 to 14 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; neutral; clear smooth boundary.

B21t—14 to 19 inches; dark brown (10YR 4/3) silty clay loam; few fine faint grayish brown (10YR 5/2) mottles; moderate very fine subangular blocky structure; firm; many dark grayish brown (10YR 4/2) clay coatings on faces of peds; acid; clear smooth boundary.

B22t—19 to 32 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; many dark grayish brown (10YR 4/2) clay coatings on faces of peds; many small iron-manganese accumulations; medium acid; clear smooth boundary.

B23t—32 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; many grayish brown (10YR 5/2) clay films on faces of peds; many small iron-manganese accumulations; slightly acid; gradual smooth boundary.

IIB3—36 to 40 inches; light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) stratified sandy loam and silt loam; weak coarse subangular blocky structure; firm; many small iron-manganese accumulations; neutral; clear smooth boundary.

IIC1—40 to 44 inches; yellowish brown (10YR 5/4) sand; single grained; loose; neutral; abrupt smooth boundary.

IIC2—44 to 60 inches; brown (10YR 5/3) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 36 to 54 inches. The depth to free carbonates ranges from 40 to 48 inches. The mollic epipedon ranges from 10 to 19 inches in thickness.

The B2t horizon has value of 4 or 5 and chroma of 2 to 4. Reaction is medium acid to mildly alkaline. The C horizon has value of 5 or 6 and chroma of 2 to 8. Reaction is neutral to moderately alkaline. Texture ranges from silt loam, sandy clay loam, or fine sandy loam to sand with some gravel in the lower part.

Bryce series

The Bryce series consists of deep, poorly drained, slowly permeable soils in slightly depressional broad areas on uplands. These soils formed in clayey lakebed sediments. Slope is 0 to 2 percent.

Bryce soils are similar to Milford soils and are commonly adjacent to Swygert soils. Bryce soils are sometimes adjacent to Martinton and Milford soils. Martinton soils are somewhat higher on the landscape, are somewhat poorly drained, and have less clay in the control section. Milford soils have less clay in the control section. Swygert soils are somewhat higher on the landscape; in the more sloping areas, they are somewhat poorly drained.

Typical pedon in an area of Bryce silty clay, 480 feet west and 285 feet north of southeast corner of sec. 3, T. 34 N., 7 E.

Ap—0 to 11 inches; black (10YR 2/1) silty clay; moderate very fine granular structure; firm; neutral; clear smooth boundary.

B1—11 to 18 inches; very dark gray (10YR 3/1) silty clay; moderate very fine and fine subangular blocky structure; firm; continuous black (10YR 2/1) coatings on faces of peds; neutral; gradual smooth boundary.

B21g—18 to 22 inches; very dark gray (5Y 3/1) silty clay; few fine faint dark grayish brown (10YR 4/2) mottles; moderate fine angular blocky structure; mildly alkaline; gradual smooth boundary.

B22g—22 to 31 inches; dark gray (5Y 4/1) silty clay; common fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium prismatic structure; very firm; many (60 percent) very dark gray (5Y 3/1) coatings on faces of peds; mildly alkaline; gradual smooth boundary.

B3g—31 to 41 inches; gray (5Y 6/1) silty clay; common fine distinct light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure; very firm; many (30 percent) dark gray (5Y 3/1) organic coatings on faces of peds; common iron-manganese accumulations; moderately alkaline; clear smooth boundary.

C1—41 to 55 inches; gray (5Y 6/1) light silty clay; common fine distinct light olive brown (2.5Y 5/6) and common fine faint dark gray (5Y 4/1) mottles; massive; firm; common iron-manganese accumulations; strong effervescence; moderately alkaline; clear smooth boundary.

C2—55 to 60 inches; mixed gray (5Y 6/1) and light olive brown (2.5Y 5/4) light silty clay; massive; firm; thin light gray (10YR 7/1) silty strata; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 50 inches. The depth to free carbonates ranges from 32 to 49 inches. The thickness of the mollic epipedon ranges from 11 to 20 inches.

The Ap horizon has value of 2 or 3 and chroma of 1. Texture is silty clay or silty clay loam. The B2 horizon has hue of 2.5Y, 5Y, or 10YR, value of 3 to 6, and chroma of 1 or 2. Reaction ranges from slightly acid to moderately alkaline in the upper part and neutral to moderately alkaline in the lower part. The C horizon is dominantly silty clay, but the range includes silty clay loam and shale.

Calamine Variant

The Calamine Variant consists of moderately deep, poorly drained, slowly permeable soils on river terraces. These soils formed in clayey lakebed sediments over shale and sandstone residuum and bedrock. Slope is 0 to 2 percent.

Calamine Variant soils are similar to Bryce soils and are commonly adjacent to Bryce, Shadeland, and High Gap soils. Bryce soils are deeper. Shadeland soils are somewhat poorly drained and have more sand and less clay in the control section. They are at slightly higher elevations. High Gap soils are moderately well drained and are fine and loamy. They are on higher ridges and slopes.

Typical pedon of Calamine Variant silty clay in an area of Bryce-Calamine Variant complex, 2,588 feet south and 26 feet east of the center of sec. 16, T. 33 N., R. 7 E.

Ap—0 to 7 inches; black (N 2/0) silty clay; strong medium granular structure; firm; mildly alkaline; abrupt smooth boundary.

A12—7 to 13 inches; very dark gray (N 3/0) silty clay; strong very fine subangular blocky structure; very firm; mildly alkaline; clear smooth boundary.

B1—13 to 16 inches; olive gray (5Y 5/2) silty clay; many fine distinct light olive brown (2.5Y 5/4) mottles; strong medium prismatic structure parting to strong very fine subangular blocky; very firm; continuous very dark gray (N 2/0) coatings on faces of peds; mildly alkaline; clear smooth boundary.

B2g—16 to 24 inches; gray (5Y 5/1) silty clay; many medium distinct light olive brown (2.5Y 5/4) mottles; strong medium prismatic structure parting to strong fine subangular blocky; very firm; continuous very dark gray (N 3/0) organic coatings on faces of peds; moderately alkaline; clear smooth boundary.

B31g—24 to 30 inches; gray (5Y 5/1) silty clay; many medium distinct light olive brown (2.5Y 5/4) mottles; strong coarse prismatic structure parting to strong fine and medium subangular blocky; very firm; moderately alkaline; common strongly alkaline light gray (5Y 7/2) lime concretions; clear smooth boundary.

B32g—30 to 35 inches; gray (5Y 5/1) silty clay; many medium distinct light olive brown (2.5Y 5/6) mottles; strong coarse prismatic structure parting to strong medium subangular blocky; very firm; patchy very dark gray (5Y 3/1) coatings on faces of peds; mildly alkaline; clear smooth boundary.

IICr—35 to 60 inches; stratified yellowish brown (10Y 5/6) siltstone and gray (5Y 5/1) shale.

The thickness of the solum varies with depth to bedrock, which ranges from 24 to 40 inches. The thickness of the mollic epipedon ranges from 11 to 20 inches.

The B2 horizon has value of 4 to 6, chroma of 1 or 2, and hue of 5Y or 2.5Y. Texture is silty clay or silty clay loam. Reaction is slightly acid to moderately alkaline. Stones are common throughout the solum.

Channahon series

The Channahon series consists of shallow, well drained, moderately permeable soils on river terraces. These soils formed in thin loamy material over limestone bedrock. Slope ranges from 1 to 4 percent.

Channahon soils are similar to Rockton soils and are commonly adjacent to Faxon and Rockton soils. Faxon soils are in depressions, are deeper over limestone, and are poorly drained. Rockton soils also are deeper to limestone.

Typical pedon in an area of Channahon loam, 1 to 4 percent slopes, 44 feet south and 367 feet east of northwest corner of sec. 35, T. 34 N., R. 8 E.

A1—0 to 8 inches; black (10YR 2/1) loam; moderate very fine granular structure; friable; neutral; clear smooth boundary.

A3—8 to 12 inches; very dark grayish brown (10YR 3/2) loam; continuous black (10YR 2/1) coatings; moderate very fine granular structure; friable; slightly acid; clear smooth boundary.

B21t—12 to 15 inches; dark brown (10YR 3/3) clay loam; continuous very dark gray (10YR 3/1) coatings on faces of peds; moderate very fine subangular blocky structure; firm; slightly acid; clear smooth boundary.

B22t—15 to 18 inches; dark yellowish brown (10YR 4/4) clay loam; continuous very dark grayish brown (10YR 3/2) coatings on faces of peds; moderate fine subangular blocky structure; firm; neutral; abrupt smooth boundary.

IIR—18 to 60 inches; yellowish brown (10YR 5/8) and very pale brown (10YR 7/4) hard limestone.

The thickness of the solum ranges from 1 to 20 inches. The thickness of the mollic epipedon anges from 8 to 15 inches.

The A1 horizon has value of 2 and chroma of 1 or 2. It is loam or silt loam. The B2 horizon has value and chroma of 3 or 4. Texture is heavy silt loam, clay loam, or sandy clay loam. Reaction is slightly acid to moderately alkaline.

Chatsworth series

The Chatsworth series consists of deep, moderately well drained, very slowly permeable soils on upland slopes bordering stream and river valleys (fig. 13). These soils formed in silty or clayey till or lakebed sediments. Slope ranges from 15 to 50 percent.

Chatsworth soils are similar to Nappanee and Swygert soils and are commonly adjacent to Blount, Morley, and Nappanee soils. Blount soils have less clay in the control section and are in nearly level and gently sloping areas higher on the landscape. Morley soils have less clay in the control sections, are moderately well drained, and are in sloping areas higher on the landscape. Nappanee and Swygert soils are in nearly level and gently sloping areas higher on the landscape. Swygert soils have a mollic epipedon.

Typical pedon in an area of Chatsworth silt loam, 15 to 50 percent slopes, 1,815 feet south of northeast corner of sec. 31, T. 33 N., R. 6 E.

Figure 13.—Chatsworth silt loam on hillsides in background. Sawmill silty clay loam is in the creek bottom.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; moderate very fine and fine subangular blocky structure; friable; many very dark gray (10YR 3/1) coatings; medium acid; clear smooth boundary.

B2—5 to 13 inches; brown (10YR 5/3) silty clay; many fine faint yellowish brown (10YR 5/4) mottles; moderate fine and medium subangular blocky structure; very firm; neutral; clear smooth boundary.

C—13 to 60 inches; gray (5Y 5/1) clay; few fine faint light olive brown (2.5Y 5/4) mottles; massive; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 15 to 20 inches. The depth to free carbonates ranges from 6 to 15 inches. The thickness of the A horizon ranges from 4 to 7 inches.

The A1 horizon has value of 3 to 5 and chroma of 1 or 2. Texture ranges from silt loam to silty clay loam. There is an A2 horizon in some pedons. The B2 horizon has value of 4 to 6 and chroma of 1 to 3. Reaction is neutral to moderately alkaline. The B2 horizon is dominantly silty clay or clay but ranges to heavy silty clay loam. The C horizon is silty clay or clay till or lakebed sediments.

Comfrey series

The Comfrey series consists of deep, poorly drained, moderately permeable soils on river and stream flood plains. These soils formed in loamy alluvial sediments. Slope is 0 to 2 percent.

Comfrey soils are similar to Sawmill soils and are commonly adjacent to Lawson and Sawmill soils. Lawson soils are somewhat poorly drained and have less sand in the control section. Sawmill soils have less sand in the control section and more clay in the Ap horizon.

Typical pedon in an area of Comfrey loam, 1,881 feet north and 81 feet west of center of sec. 33, T. 33 N., R. 7 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam; weak very fine granular structure; friable; common roots; mildly alkaline; clear smooth boundary.

A12—8 to 19 inches; black (10YR 2/1) loam; moderate fine granular; friable; common roots; mildly alkaline; gradual smooth boundary.

A13—19 to 29 inches; black (10YR 2/1) loam; weak coarse subangular blocky structure parting to moderate fine granular; friable; common fine roots; mildly alkaline; gradual smooth boundary.

C1g—29 to 49 inches; dark grayish brown (2.5Y 4/2) clay loam; few fine faint dark brown (10YR 4/3) mottles; massive; firm; common roots; mildly alkaline; gradual smooth boundary.

C2g—49 to 56 inches; gray (5Y 4/1) clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; very dark gray (10YR 3/1) organic stains; massive; firm; many somewhat hard iron patches; occasional roots; slight effervescence; mildly alkaline; gradual smooth boundary.

C3g—56 to 65 inches; gray (10YR 5/1) sandy clay loam; common fine distinct yellowish brown (10YR 5/6) and common medium distinct gray (10YR 6/1) mottles; massive; firm; occasional roots; slight effervescence; mildly alkaline.

The thickness of the mollic epipedon ranges from 29 to 40 inches. The depth to free carbonates ranges from 48 to more than 60 inches.

The A horizon is typically loam, but the range includes clay loam and silty clay loam. It has value of 2 or 3. The C horizon is stratified, ranging from clay loam to fine sandy loam and silty clay loam. It is mildly or moderately alkaline. It has value of 4 or 5 and chroma of 1 or 2 in hue of 5Y or 10YR.

Darroch series

The Darroch series consists of deep, somewhat poorly drained, moderately slowly permeable soils on outwash plains on uplands. These soils formed in loamy material over stratified outwash. Slope is 0 to 2 percent.

Darroch soils are similar to Brenton, Jasper, and Ridgeville soils and are commonly adjacent to Jasper and Selma soils. Brenton soils have less sand in the control section. Jasper soils are on ridges and side slopes and are well drained. Ridgeville soils are coarse and loamy. Selma soils are in broad depressions and are poorly drained.

Typical pedon in an area of Darroch silt loam, 2,565 feet south and 40 feet west of center of sec. 24, T. 33 N., R. 7 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam; weak fine granular structure; friable; slightly acid; gradual smooth boundary.

A3—10 to 16 inches; black (10YR 2/1) silty clay loam; weak to moderate fine granular structure; friable; few fine yellowish brown (10YR 5/4) included peds of B horizon material; neutral; clear smooth boundary.

B21t—16 to 21 inches; dark grayish brown (10YR 4/2) clay loam; common fine faint yellowish brown (10YR 5/4) mottles; weak to moderate coarse subangular blocky structure parting to weak to moderate fine subangular blocky; firm; many (50 percent) very dark gray (10YR 3/1) clay films on faces of peds; neutral; clear smooth boundary.

B22t—21 to 28 inches; yellowish brown (10YR 5/4) clay loam; few fine faint grayish brown (10YR 5/2) mottles; weak to moderate coarse subangular blocky structure; firm; many (25 percent) very dark gray (10YR 3/1) clay films on faces of peds; neutral clear smooth boundary.

B3—28 to 39 inches; mixed light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) loam; weak coarse subangular blocky structure; friable; few dark grayish brown (10YR 4/2) organic stains in root channels; many fine iron accumulations; mildly alkaline; gradual smooth boundary.

C1—39 to 49 inches; mixed light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/8) fine sandy loam; massive; very friable; dark grayish brown (10YR 4/2) krotovinas at base of horizon; many fine iron accumulations; slight effervescence; moderately alkaline; clear smooth boundary.

IIC2—49 to 65 inches; mixed very pale yellow (10YR 7/4) and brownish yellow (10YR 6/6) sand; single grained; loose; moderately alkaline.

The thickness of the solum ranges from 36 to 44 inches. The depth to free carbonates ranges from 28 to 46 inches. The thickness of the mollic epipedon ranges from 13 to 20 inches.

The Ap horizon has typical value of 2, but the range includes 3. Texture is dominantly silt loam, but the range includes loam. The B2 horizon has value of 4 or 5 and chroma of 2 to 4. Texture ranges from silty clay loam to clay loam in the upper part and clay loam to loam, sandy clay loam, or heavy sandy loam in the lower part. Reaction is medium acid to moderately alkaline. The C horizon is stratified loam, sandy loam, loamy sand, or sand. The reaction is mildly or moderately alkaline.

Drummer series

The Drummer series consists of deep, poorly drained, moderately permeable soils on outwash plains or till plains on uplands. These soils formed in medium textured material and the underlying stratified loamy outwash. Slope is 0 to 2 percent.

Drummer soils are similar to Selma soils and are commonly adjacent to Brenton and Proctor soils. They are occasionally adjacent to Elliott, Martinton, and Milford soils. Brenton soils are at higher elevations and are somewhat poorly drained. Elliott soils formed mostly in glacial till, are somewhat poorly drained, and have more clay in the control section. Martinton soils are somewhat poorly drained. Milford and Martinton soils have more clay in the control section. Selma soils have more sand in the control section.

Typical pedon in an area of Drummer silty clay loam, 600 feet south and 57 feet west of northeast corner of sec. 12, T. 34 N., R. 6 E.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam; weak medium granular structure; friable; slightly acid; clear smooth boundary.

A12—9 to 14 inches; black (10YR 2/1) silty clay loam; moderate medium granular structure; friable; neutral; clear smooth boundary.

B21g—14 to 20 inches; olive gray (5Y 5/2) silty clay loam; moderate very fine and fine subangular blocky structure; firm; many black (10YR 2/1) coatings on faces of peds; neutral; clear smooth boundary.

B22g—20 to 27 inches; olive gray (5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common black (10YR 2/1) coatings on faces of peds; neutral; clear smooth boundary.

B23g—27 to 36 inches; light olive gray (5Y 6/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure in upper 6 inches grading to moderate medium prismatic in lower 3 inches of horizon; firm; very dark grayish brown (10YR 3/2) coatings in root channels; some iron-manganese accumulations; dark gray (10YR 4/1) coatings in lower 3 inches of horizon; neutral; clear smooth boundary.

B31g—36 to 45 inches; light olive gray (5Y 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; common very dark gray (10YR 3/1) coatings in root channels; some iron-manganese accumulations; neutral; gradual smooth boundary.

IIB32g—45 to 53 inches; mixed light yellowish brown (2.5Y 6/3) and brownish yellow (10YR 6/6) stratified silt loam and sandy loam; weak coarse subangular blocky structure; very friable; strong effervescence; moderately alkaline; gradual smooth boundary.

IICg—53 to 60 inches; mixed light gray (5Y 7/2) and yellowish brown (10YR 5/8) fine sandy loam; some pebbles 2 to 5 millimeters in diameter; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 38 to 53 inches. The mollic epipedon ranges from 10 to 16 inches in thickness. The depth to free carbonates ranges from 31 to 60 inches.

The Ap horizon is dominantly silty clay loam, but the range includes silt loam. The B2 horizon has a value of 4 to 6 and chroma of 1 or 2. Reaction is slightly acid or neutral in the upper part and neutral to moderately alkaline in the lower part. The IIC horizon has value of 4 to 7 and chroma of 1 to 8. The texture is stratified fine sandy loam, loam, silt loam, or silty clay loam.

Elliott series

The Elliott series consists of deep, somewhat poorly drained, moderately slowly permeable soils on till plains on uplands. These soils formed in a thin layer of silty material and silty clay loam glacial till. Slope ranges from 0 to 5 percent.

Elliott soils are similar to Andres soils and are commonly adjacent to Ashkum and Varna soils. They are sometimes adjacent to Drummer soils. Andres soils have more sand in the control section. Ashkum soils are in depressional areas, are poorly drained, and have more clay in the A horizon. Varna soils are moderately well drained and more sloping. Drummer soils have less clay in the control section and are poorly drained.

Typical pedon in an area of Elliott silt loam, 0 to 2 percent slopes, 1,821 feet south and 210 feet east of northwest corner of sec. 27, T. 31 N., R. 7 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam; moderate fine and medium granular structure; friable; many roots; slightly acid; clear smooth boundary.

A3—10 to 15 inches; very dark gray (10YR 3/1) silt loam; moderate fine subangular blocky structure; firm; few fine dark yellowish brown (10YR 4/4) included peds of B horizon material; many fine roots; slightly acid; clear smooth boundary.

B21t—15 to 20 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; firm; many very dark gray (10YR 3/1) clay films on faces of peds; common fine roots; slightly acid; clear smooth boundary.

B22t—20 to 27 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; firm; continuous dark gray (10YR 4/1) clay films on faces of peds; common fine roots; few fine iron-manganese accumulations; neutral; clear smooth boundary.

B23t—27 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; many dark gray (10YR 4/1) clay films on faces of peds; many iron-manganese accumulations; neutral; few fine roots; clear smooth boundary.

B3—33 to 38 inches; gray (5Y 6/1) silty clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; very dark grayish brown (10YR 3/2) organic channel fillings; common thin gray (10YR 6/1) clay films on faces of peds; few fine roots; many iron-manganese accumulations; mildly alkaline; abrupt smooth boundary.

C—38 to 60 inches; mixed gray (5Y 6/1) and yellowish brown (10YR 5/6) silty clay loam; massive; firm; few fine roots; many iron-manganese accumulations; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 34 to 45 inches. The depth to free carbonates ranges from 28 to 40 inches. The mollic epipedon ranges from 10 to 19 inches in thickness.

The Ap horizon has value of 2 or 3 and chroma of 1. The B2t horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 to 4. Reaction is slightly acid to moderately alkaline. The C horizon has value of 5 or 6 and chroma of 1 to 4.

Faxon series

The Faxon series consists of moderately deep, poorly drained, moderately permeable soils in depressions on river terraces. These soils formed in 20 to 40 inches of loamy material over bedrock. Slope is 0 to 2 percent.

Faxon soils are similar to Selma soils and are commonly adjacent to Channahon and Rockton soils. Selma soils are not underlain by bedrock. Channahon soils are on ridges. They are well drained and shallower to bedrock. Rockton soils are also on ridges and are well drained.

Typical pedon of Faxon silty clay loam, 1,320 feet east and 30 feet north of center of sec. 35, T. 34 N., R. 8 E.

A11—0 to 9 inches; black (N 2/0) silty clay loam; moderate medium granular structure; friable; mildly alkaline; clear smooth boundary.

A12—9 to 19 inches; black (N 2/0) silty clay loam; weak coarse subangular blocky structure; firm; mildly alkaline; gradual smooth boundary.

B21g—19 to 27 inches; dark gray (5Y 4/1) clay loam; common fine distinct light olive brown (2.5Y 5/4) mottles; weak coarse prismatic structure; firm; many very dark gray (10YR 3/1) coatings on faces of peds; mildly alkaline; clear smooth boundary.

B22g—27 to 34 inches; gray (5Y 5/1) clay loam; common fine distinct olive yellow (2.5Y 6/6) mottles; moderate medium prismatic structure; firm; mildly alkaline; abrupt smooth boundary.

IIR—34 to 60 inches; limestone.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. The thickness of the mollic epipedon ranges from 13 to 19 inches.

The A horizon has chroma of 0 or 1. Texture ranges from silty clay loam to loam. The B horizon has value of 4 or 5 and chroma of 1 or 2 in hue of 10YR, 2.5Y, or 5Y. Texture ranges from silty clay loam to clay loam and sandy loam. Reaction is neutral to moderately alkaline. The bedrock is weathered and has some flags in the upper layer.

Gilford series

The Gilford series consists of deep, poorly drained soils on broad flats of sandy outwash plains on uplands. These soils formed in sandy and loamy outwash. The subsoil is moderately rapidly permeable, and the substratum is rapidly permeable. Slope is 0 to 2 percent.

Gilford soils are similar to Maumee and Selma soils and are commonly adjacent to Ade and Ridgeville soils. Ade soils are on slightly or moderately elevated ridges and are somewhat excessively drained. Maumee soils are sandier in the control section. Ridgeville soils are slightly higher on the landscape and are somewhat poorly drained. Selma soils have more clay in the control section.

Typical pedon in an area of Gilford fine sandy loam, 231 feet north and 75 feet east of southwest corner of sec. 27, T. 33 N., R. 8 E.

Ap—0 to 10 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; very friable; mildly alkaline; abrupt smooth boundary.

A12—10 to 17 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium subangular blocky structure; friable; neutral; gradual wavy boundary.

A3—17 to 22 inches; very dark grayish brown (2.5Y 3/2) heavy fine sandy loam; few fine faint olive brown (2.5Y 4/4) mottles; weak fine and medium prismatic structure parting to moderate medium subangular blocky; friable; many very dark grayish brown (2.5Y 3/2) and very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; gradual smooth boundary.

B2g—22 to 33 inches; dark grayish brown (2.5Y 4/2) heavy fine sandy loam; common fine faint dark gray (10YR 4/1) common fine distinct yellowish brown (10YR 5/6), and few fine distinct (10YR 5/8) mottles; weak medium prismatic structure parting to moderate medium and coarse subangular blocky;

friable; few very dark grayish brown (2.5Y 3/2) organic coatings on faces of peds; neutral; gradual wavy boundary.

B3g—33 to 41 inches; mixed grayish brown (2.5Y 5/2) and dark grayish brown (2.5Y 4/2) fine sandy loam; few fine distinct light olive brown (2.5Y 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; neutral; gradual wavy boundary.

C1—41 to 54 inches; light olive gray (5Y 6/2) sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grained; loose; neutral; gradual wavy boundary.

C2—54 to 60 inches; yellowish brown (10YR 5/8) sand; common medium distinct gray (5Y 6/1) and common medium distinct light olive gray (5Y 6/2) mottles; single grained; loose; neutral.

The thickness of the solum ranges from 30 to 44 inches. The thickness of the mollic epipedon ranges from 10 to 22 inches.

The Ap horizon has value of 2 in chromas of 0 or 1. The B2g horizon has value of 4 to 6 and chroma of 1 or 2. It commonly is fine sandy loam but in places loamy fine sand occurs. Reaction is slightly acid or neutral. The C horizon is slightly acid to moderately alkaline and is sand or loamy sand.

High Gap series

The High Gap series consists of moderately deep, moderately well drained, moderately permeable soils on river terraces. These soils formed in loamy outwash and residuum over interbedded sandstone and shale bedrock. They are outside the range defined for the High Gap series in having a darker, thicker A1 or Ap horizon and in lacking an A2 horizon, but these differences do not alter use and management of the soils. Slope ranges from 1 to 5 percent.

High Gap soils are similar to and commonly adjacent to Bryce, the Calamine Variant, and Shadeland soils. Bryce soils are poorly drained and in low depressions. Calamine Variant soils are in lower flat areas, are poorly drained, and are more clayey. Shadeland soils are nearly level. They are somewhat poorly drained and are less sandy.

Typical pedon in an area of High Gap loam, 1 to 5 percent slopes, 495 feet south and 2,710 feet east of northwest corner of sec. 4, T. 33 N., R. 7 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) loam; brown (10YR 5/3) dry; weak medium granular structure; friable; medium acid; abrupt smooth boundary.

B1—9 to 13 inches; dark yellowish brown (10YR 4/4) loam; weak very fine subangular blocky structure; friable; very strongly acid; clear smooth boundary.

B21—13 to 17 inches; yellowish brown (10YR 5/6) loam; weak very fine subangular blocky structure; friable; very strongly acid; clear smooth boundary.

B22t—17 to 24 inches; yellowish brown (10YR 5/4) clay loam with many medium distinct yellowish brown (10YR 5/8) and common fine pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; firm; very strongly acid; common soft sandstone fragments; clear smooth boundary.

B23t—24 to 31 inches; mixed gray (N 6/0) and yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; firm; common soft sandstone fragments; very strongly acid; abrupt smooth boundary.

IIB3—31 to 36 inches; greenish gray (5GY 5/1) silty clay loam with many large prominent yellowish brown (10YR 5/8) mottles; some very dark gray (10YR 3/1) coatings on faces of peds; weak medium prismatic structure parting to weak medium subangular blocky; firm; medium acid; abrupt smooth boundary.

IICr1—36 to 38 inches; yellowish brown (10YR 5/6) weathered sandstone.

IICr2—38 to 60 inches; sandstone and shale stratified, with sandstone predominant.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The thickness of the mollic epipedon ranges from 8 to 10 inches.

The Ap horizon has value of 3 or 2 and chroma of 1 or 2. The B2 horizon has value of 4 to 6 and chroma of 0 to 8. Texture is loam, sandy clay loam, or clay loam. Reaction is medium acid to very strongly acid.

Hononegah series

The Hononegah series consists of deep, excessively drained soils on river terraces. Permeability is very rapid. These soils formed in sandy material containing some gravel. Slope ranges from 1 to 15 percent.

Hononegah soils are very similar to Sparta soils and are commonly adjacent to Ade, Warsaw, Darroch, and Jasper soils. Ade soils do not have gravel in the solum and have bands of heavy loamy sand or sandy loam in the lower part of the B horizon. Warsaw soils have more clay in the B horizon. Darroch soils have more clay and no gravel in the control section and are somewhat poorly drained. Jasper soils lack gravel and have more clay in the B horizon. Sparta soils lack gravel in the solum.

Typical pedon in an area of Hononegah loamy sand, 1 to 5 percent slopes, 432 feet north and 1,600 feet west of center of sec. 31, T. 34 N., R. 8 E.

A11—0 to 11 inches; black (10YR 2/1) loamy sand; weak fine and medium subangular blocky structure; very friable; strongly acid; clear smooth boundary.

A12—11 to 20 inches; very dark brown (10YR 2/2) loamy sand; weak fine and medium subangular blocky structure; very friable; medium acid; clear smooth boundary.

B1—20 to 24 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine subangular blocky structure; very friable; strongly acid; abrupt smooth boundary.
B2—24 to 28 inches; brown (10YR 4/3) loamy sand; weak medium subangular blocky structure; very friable; about 10 percent gravel; medium acid; abrupt smooth boundary.
C—28 to 60 inches; brown (10YR 4/3) sand; single grained; loose; about 10 percent gravel; mildly alkaline.

The thickness of the solum ranges from 24 to 43 inches. The mollic epipedon ranges from 13 to 24 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B2 horizon has value of 3 or 4 and chroma of 3 to 6 in hue of 10YR or 7.5YR. It is loamy sand or sand and is 5 to 15 percent pebbles. Reaction is medium acid to moderately alkaline. The C horizon is slightly acid to moderately alkaline. It is loamy sand or sand with some gravel. Reaction is slightly acid to moderately alkaline.

Jasper series

The Jasper series consists of deep, well drained soils on uplands and stream or river terraces. Permeability is moderate in the solum and moderately rapid in the underlying material. These soils formed in loamy materials over loamy and sandy outwash. Slope ranges from 0 to 6 percent.

Jasper soils are very similar to Proctor soils and are commonly adjacent to Darroch and Selma soils. Darroch soils are somewhat poorly drained. Proctor soils have less sand in the control section. Selma soils are poorly drained and are in slight depressions. They have more clay in the A horizon.

Typical pedon in an area of Jasper silt loam, sandy substratum, 0 to 2 percent slopes, 900 feet east and 90 feet north of southwest corner of sec. 23, T. 32 N., R. 7 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam; weak fine and medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.
A3—10 to 18 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; many very dark grayish brown (10YR 3/2) organic coatings on faces of peds; common fine roots; neutral; clear smooth boundary.
B21t—18 to 26 inches; dark brown (10YR 4/3) loam; weak medium subangular blocky structure; firm; common fine roots; slightly acid; abrupt smooth boundary.
B22t—26 to 39 inches; dark brown (10YR 4/3) clay loam; weak medium subangular blocky structure parting to moderate fine subangular blocky; firm; common very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine roots; medium acid; clear smooth boundary.
B3t—39 to 46 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure; firm; common very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine roots; slightly acid; gradual smooth boundary.
C1—46 to 50 inches; yellowish brown (10YR 5/6) loamy sand; single grained; loose; few fine roots; slightly acid; gradual smooth boundary.
C2—50 to 60 inches; yellowish brown (10YR 5/6) sand; single grained; loose; slightly acid.

The thickness of the solum ranges from 33 to 48 inches. The mollic epipedon ranges from 10 to 21 inches in thickness.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The B2 horizon has value of 4 to 6 and chroma of 3 to 6. Texture is silty clay loam or clay loam. Reaction is medium acid to neutral. The C horizon is stratified with clay loam, loam, loamy sand, or sand.

Kane series

The Kane series consists of deep, somewhat poorly drained soils on river terraces. Permeability is moderate in the upper part and rapid in the lower part. These soils formed in 25 to 40 inches of loamy material and the underlying stratified gravel and sand. Slope is 0 to 2 percent.

Kane soils are similar to Warsaw soils and are commonly adjacent to Warsaw and Hononegah soils. Warsaw soils are on ridges or side slopes, lack argillic horizons, and are well drained. Hononegah soils lack argillic horizons and are sandier than Kane soils.

Typical pedon in an area of Kane silt loam, 552 feet north and 84 feet west of center of sec. 33, T. 34 N., R. 8 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam; moderate very fine granular structure; friable; neutral; abrupt smooth boundary.
A12—7 to 11 inches; very dark gray (10YR 3/1) silt loam; moderate fine granular structure; friable; neutral; clear smooth boundary.
B21t—11 to 15 inches; brown (10YR 5/3) silty clay loam; many medium faint yellowish brown (10YR 5/6) and common fine faint grayish brown (10YR 5/2) mottles; moderate very fine subangular blocky structure; firm; with continuous dark grayish brown (10YR 4/2) thin clay films on faces of peds; medium acid; clear smooth boundary.
B22t—15 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; many medium faint yellowish brown (10YR 5/6) and common fine faint grayish brown (10YR 5/2) mottles; moderate very fine subangular blocky structure; firm; with continuous dark grayish brown (10YR 4/2) thin clay films on faces of peds; medium acid; clear smooth boundary.

B23t—20 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct yellowish brown (10YR 5/8) and many fine distinct grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; continuous dark grayish brown (10YR 4/2) thin clay films on faces of peds; slightly acid; clear smooth boundary.

IIB3t—26 to 34 inches; yellowish brown (10YR 5/6) clay loam with many medium faint yellowish brown (10YR 5/8) and many fine faint brown (10YR 5/3) mottles; moderate medium subangular blocky structure; firm; dark brown (7.5YR 4/4) thin clay films on vertical faces of peds; neutral; gradual smooth boundary.

IIC—34 to 60 inches; yellowish brown (10YR 5/4) and light gray (10YR 7/2) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 25 to 35 inches. The depth to free carbonates ranges from 20 to 34 inches. The mollic epipedon ranges from 11 to 16 inches in thickness.

The A horizon has value of 2 or 3 and chroma of 1. The B2 horizon has value of 4 or 5 and chroma of 2 to 4. Reaction is medium acid to moderately alkaline. The C horizon is loam, sand, or mixed sand and gravel.

Lawson series

The Lawson series consists of deep, somewhat poorly drained, moderately permeable soils on river and stream flood plains. These soils formed in deep silt loam and light silty clay loam alluvial sediments. Slope is 0 to 2 percent.

Lawson soils are similar to Comfrey and Sawmill soils and are commonly adjacent to Ross and Sawmill soils. Comfrey soils are poorly drained and have more sand in the control section. Ross soils are well drained and have more sand in the control section. Sawmill soils are poorly drained and have more clay in the solum.

Typical pedon in an area of Lawson silt loam, 1,070 feet south of center of sec. 9, T. 33 N., R. 7 E.

A11—0 to 14 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; mildly alkaline; gradual smooth boundary.

A12—14 to 26 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; mildly alkaline; gradual smooth boundary.

A13—26 to 33 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine subangular blocky structure; friable; mildly alkaline; gradual smooth boundary.

C—33 to 60 inches; dark grayish brown (10YR 4/2) silt loam, dark grayish brown (10YR 4/2) rubbed; few fine faint yellowish brown (10YR 5/4) mottles; massive; friable; mildly alkaline.

The thickness of the mollic epipedon ranges from 27 to 36 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The lower A horizon is neutral or mildly alkaline. It is silt loam or light silty clay loam. The C horizon is silt loam, light silty clay loam, or clay loam. Reaction is mildly or moderately alkaline.

Martinsville series

The Martinsville series consists of deep, well drained, moderately permeable soils on river terraces or uplands. These soils formed in loamy outwash. Slope ranges from 1 to 10 percent.

Martinsville soils are similar to Jasper soils and are commonly adjacent to Darroch, Jasper, and Starks soils. Darroch soils have a mollic epipedon and are somewhat poorly drained. Jasper soils have a mollic epipedon. Starks soils are somewhat poorly drained and have less sand in the control section.

Typical pedon in an area of Martinsville loam, 1 to 5 percent slopes, 1,631 feet west and 1,296 feet south of northeast corner of sec. 30, T. 33 N., R. 8 E.

Ap—0 to 8 inches; dark brown (10YR 4/3) loam; weak very coarse granular structure; very friable; medium acid; few fine roots; clear smooth boundary.

B21t—8 to 17 inches; dark brown (10YR 4/3) loam; moderate fine and medium blocky structure; firm; many dark brown (10YR 3/3) clay films on faces of peds; few fine roots; medium acid; gradual smooth boundary.

B22t—17 to 28 inches; dark brown (10YR 4/3) loam; moderate medium blocky structure; firm; many dark brown (10YR 3/3) clay films on faces of peds; few fine roots; medium acid; gradual smooth boundary.

B23t—28 to 39 inches; dark brown (10YR 4/3) clay loam; moderate coarse subangular blocky structure; firm; common dark brown (10YR 3/3) clay films on faces of peds; few fine roots; medium acid; clear smooth boundary.

B3—39 to 60 inches; dark brown (10YR 4/3) loam; weak coarse subangular blocky structure; friable; few fine roots; medium acid.

The thickness of the solum ranges from 36 to 60 inches. The depth to free carbonates ranges from 43 to more than 60 inches.

The Ap horizon has a value of 4 and chroma of 2 or 3. Texture ranges from fine sandy loam to silt loam. Some pedons have A2 horizons. The B2 horizon has value of 4 or 5 and chroma of 3 to 6 in hue of 10YR or 7.5YR. Texture is silty clay loam, clay loam, sandy clay loam, loam, or sandy loam. Reaction is strongly acid or medium acid in the upper part and medium acid to neutral in the lower part.

Martinton series

The Martinton series consists of deep, somewhat poorly drained soils on uplands. These soils formed in

silty and clayey lakebed sediments. The subsoil is moderately slowly permeable, and the substratum is slowly permeable. Slope is 0 to 3 percent.

Martinton soils are similar to Brenton, Elliott, and Milford soils and are commonly adjacent to Milford soils. Brenton soils contain less clay in the control section and in the underlying material. Elliott soils have silty clay loam glacial till in the solum. Milford soils are in depressional areas and are poorly drained.

Typical pedon in an area of Martinton silt loam, 0 to 3 percent slopes, 2,520 feet south and 30 feet west of center of sec. 12, T. 34 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A12—8 to 12 inches; black (10YR 2/1) silt loam; moderate fine and medium granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

B21t—12 to 18 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common fine roots; many very dark gray (10YR 3/1) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—18 to 25 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many very dark gray (10YR 3/1) clay films on faces of peds; a few small iron-manganese accumulations; medium acid; clear smooth boundary.

B23t—25 to 30 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium and coarse angular blocky; firm; common fine roots; many very dark gray (10YR 3/1) clay films on faces of peds; common small iron-manganese accumulations; slightly acid; clear smooth boundary.

B3—30 to 37 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine distinct yellowish brown (10YR 5/6) and many fine faint light yellowish brown (2.5Y 6/4) mottles; weak coarse angular blocky structure; firm; few fine roots; common very dark gray (10YR 3/1) clay films in root channels; common small iron-manganese accumulations; mildly alkaline; clear smooth boundary.

C—37 to 60 inches; mottled gray (5Y 6/1), light yellowish brown (2.5Y 6/4), and yellowish brown (10YR 5/6) silty clay loam; massive; firm; few fine roots; few white (10YR 8/1) hard calcium accumulations in upper 6 inches of horizon; moderately alkaline.

The thickness of the solum ranges from 32 to 45 inches. The mollic epipedon ranges from 10 to 14 inches in thickness. The depth to free carbonates ranges from 36 to more than 60 inches.

The B2t horizon has value of 5 or 6 and chroma of 2. Texture is silty clay loam, or silty clay. Reaction is medium acid to neutral. The C horizon is uniform silty clay loam or stratified silt loam, silty clay loam, and silty clay.

Maumee series

The Maumee series consists of deep, poorly drained, rapidly permeable soils on sandy outwash plains on uplands. These soils formed in deep sandy outwash. Slope is 0 to 2 percent.

Maumee soils are similar to Gilford and Watseka soils and are commonly adjacent to Sparta and Watseka soils. Gilford soils contain more clay. Sparta soils are higher on the landscape and are excessively drained. Watseka soils are somewhat poorly drained.

Typical pedon in an area of Maumee loamy fine sand, 960 feet south and 81 feet west of northeast corner of sec. 23, T. 32 N., R. 8 E.

Ap—0 to 10 inches; black (10YR 2/1) loamy fine sand; few fine faint brown (10YR 5/3) mottles in lower 5 inches of horizon; weak coarse granular structure; very friable; neutral; abrupt smooth boundary.

A12—10 to 15 inches; very dark grayish brown (10YR 3/2) loamy fine sand; common fine distinct yellowish brown (10YR 5/4) mottles; weak coarse subangular blocky structure; very friable; very dark gray (10YR 3/1) coatings on faces of peds; mildly alkaline; clear smooth boundary.

C1—15 to 25 inches; grayish brown (2.5Y 5/2) sand; weak coarse prismatic structure; very friable; mildly alkaline; gradual smooth boundary.

C2—25 to 60 inches; light brownish gray (2.5Y 6/2) sand; single grained; loose; mildly alkaline.

The thickness of the mollic epipedon ranges from 14 to 18 inches. The A horizon is dominantly loamy fine sand, but the range includes loamy sand.

The C horizon has value of 5 or 6 and chroma of 2. Reaction is medium acid to moderately alkaline. The texture is sand or loamy sand.

Milford series

The Milford series consists of deep, poorly drained, moderately slowly permeable soils on uplands. They formed in moderately fine and fine textured lakebed sediments. Slopes range from 0 to 1 percent.

Milford soils are similar to Ashkum soils and are commonly adjacent to Bryce, Martinton, and Swygert soils. Ashkum soils have calcareous glacial till in the lower part of the B horizon and in the C horizon. Bryce soils are on a similar landscape position but are higher in clay content throughout the solum. Martinton soils are somewhat

poorly drained. Swygert soils are higher on the landscape than Milford soils, are somewhat poorly drained, and have more clay in the B horizon.

Typical pedon in an area of Milford silty clay loam 48 feet west and 1,775 feet south of center of sec. 12, T. 34 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam; moderate very fine angular blocky structure; firm; many fine roots; slightly acid; clear smooth boundary.

A12—8 to 16 inches; very dark gray (10YR 3/1) silty clay loam; moderate very fine subangular blocky structure; firm; many fine roots; many black (10YR 2/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B1g—16 to 22 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; many fine roots; many very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

B21g—22 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to strong fine and medium angular blocky; firm; common fine roots; many very dark gray (10YR 3/1) organic coatings on faces of peds; a few small iron-manganese accumulations; mildly alkaline; abrupt smooth boundary.

B22g—28 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine faint light brownish gray (2.5Y 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; few fine roots; common very dark gray (10YR 3/1) organic coatings on faces of peds; a very dark gray (10YR 3/1) krotovina; mildly alkaline; clear smooth boundary.

B3g—33 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine faint light olive brown (2.5Y 5/4) and common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; common gray (10YR 5/1) coatings on faces of peds; mildly alkaline; clear smooth boundary.

Cg—39 to 60 inches; mottled grayish brown (2.5Y 5/2), light olive brown (2.5Y 5/4), gray (5Y 6/1), and yellowish brown (10YR 5/6) silty clay loam; massive; firm; few fine roots; strong effervescence; mildly alkaline.

The thickness of the solum ranges from 36 to 50 inches. The thickness of the mollic epipedon ranges from 10 to 18 inches. The depth to free carbonates ranges from 36 to more than 60 inches.

The B2 horizon has hue of 10YR, 2.5Y, or 5Y, value of 4 or 5, and chroma of 1 to 6. It is dominantly silty clay loam, but the range includes light silty clay. Reaction of the B2 horizon is slightly acid to mildly alkaline. The C horizon is silty clay loam, loam, or silty clay.

Morley series

The Morley series consists of deep, moderately well drained, slowly permeable soils on uplands. These soils formed in silty clay loam glacial till with a thin layer of overlying silty material. Slope ranges from 2 to 10 percent.

Morley soils are similar to Blount soils and are commonly adjacent to Ashkum, Blount, Chatsworth, and Elliott soils. Ashkum soils are in broad depressions, are poorly drained, have a mollic epipedon, and have more clay in the A horizon. Blount soils are somewhat poorly drained. Chatsworth soils have grayer B2 horizons and have more clay in the B2 and C horizons. Elliott soils have a mollic epipedon and are somewhat poorly drained.

Typical pedon in an area of Morley silt loam, 2 to 5 percent slopes, 528 feet south and 759 feet west of the northeast corner of sec. 26, T. 34 N., R. 8 E.

A1—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; common fine roots; medium acid; clear smooth boundary.

A2—5 to 11 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; common fine roots; very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B21t—11 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; firm; common fine roots; many dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—16 to 21 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; continuous dark brown (10YR 4/3) clay films; slightly acid; clear smooth boundary.

B23t—21 to 29 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium prismatic structure; firm; continous dark brown (7.5YR 3/2) clay films on faces of peds; slight effervescence; mildly alkaline; clear smooth boundary.

B3—29 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; common fine faint light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; common dark grayish brown (10YR 3/2) clay films on faces of peds; strong effervescence; moderately alkaline; clear smooth boundary.

C1—38 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; common fine faint light brownish gray (10YR 6/2) mottles; massive; firm; moderately alkaline; strong effervescence.

C2—48 to 60 inches; yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) silty clay loam; massive; firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 22 to 48 inches. The depth to free carbonates ranges from 20 to 32 inches.

The A1 horizon has value of 3 or 4. Some pedons lack A2 horizons. The B2 horizon has value of 4 or 5 and chroma of 2 to 6. Texture is dominantly silty clay loam, but the range includes silty clay. Reaction is strongly acid to moderately alkaline.

Nappanee series

The Nappanee series consists of deep, somewhat poorly drained, very slowly permeable soils on uplands. These soils formed in silty and clayey glacial till or lakebed sediments. Slope ranges from 0 to 5 percent.

Nappanee soils are similar to Blount soils and are commonly adjacent to Blount, Chatsworth, and Swygert soils. Blount soils have less clay in the B and C horizons. Chatsworth soils have a thinner solum. Swygert soils have a mollic epipedon.

Typical pedon in an area of Nappanee silt loam, 2 to 5 percent slopes, 2,694 feet north and 1,443 feet east of southwest corner of sec. 31, T. 33 N., R. 6 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak very fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

B1—7 to 14 inches; light yellowish brown (10YR 6/4) silty clay loam; few fine faint light brownish gray (10YR 6/2) mottles; moderate very fine and fine subangular blocky structure; firm; common fine roots; few dark grayish brown (10YR 4/2) coatings on faces of peds; medium acid; clear smooth boundary.

B21t—14 to 19 inches; grayish brown (10YR 5/2) silty clay; few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; common fine roots; small iron-manganese accumulations; strongly acid; clear smooth boundary.

B22t—19 to 30 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse angular blocky structure; firm; common fine roots; many dark gray (10YR 4/1) clay films on faces of peds; some very dark gray (10YR 3/1) clay coatings in root channels; small iron-manganese accumulations; neutral; clear smooth boundary.

C—30 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; massive; some vertical cleavage planes; firm; some white (10YR 8/1) lime accumulations within matrix and on surfaces of cleavage planes; some patches of dark gray (10YR 4/1) clay films on faces of peds in upper part; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 20 to 40 inches.

The Ap horizon has value of 4 or 3 and chroma of 1 or 2. Some pedons have an A2 horizon. The B2 horizon has value of 5 or 6 and chroma of 1 or 2 in hues of 10YR to 5Y. Texture is silty clay loam, silty clay, or clay. Reaction is strongly acid to moderately alkaline. The C horizon is silty clay loam or silty clay.

Papineau series

The Papineau series consists of deep, somewhat poorly drained, moderately permeable over slowly permeable soils on uplands. These soils formed in loamy material and silty clay or clay lacustrine sediments. Slope is 0 to 2 percent.

Papineau soils are commonly adjacent to Bryce, Selma, and Swygert soils. Bryce soils lack the sandy and loamy material in the A and upper B horizons. They are in depressions and are poorly drained. Selma soils are in broad depressions, are poorly drained, and do not have clayey material in the lower part of the solum. Swygert soils have more clay in the A and upper B horizons.

Typical pedon in an area of Papineau sandy loam, 630 feet west and 762 feet south of the center of sec. 33, T. 33 N., R. 8 E.

Ap—0 to 10 inches; black (10YR 2/1) sandy loam; weak fine granular structure; friable; slightly acid; clear smooth boundary.

A12—10 to 13 inches; very dark gray (10YR 3/1) sandy clay loam; few fine faint dark brown (10YR 4/3) mottles; moderate fine subangular blocky structure; friable; medium acid; clear smooth boundary.

B1—13 to 17 inches; dark grayish brown (10YR 4/2) sandy clay loam; few fine faint dark brown (10YR 4/3) mottles; moderate fine subangular blocky structure; firm; slightly acid; clear smooth boundary.

B21t—17 to 24 inches; grayish brown (2.5Y 5/2) sandy clay loam; medium fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; dark grayish brown (2.5Y 4/2) coatings on faces of peds; slightly acid; clear smooth boundary.

B22t—24 to 32 inches; grayish brown (2.5Y 5/2) sandy clay loam; many fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; neutral; abrupt smooth boundary.

IIB3—32 to 41 inches; mottled gray (5Y 5/1) and light olive brown (2.5Y 5/4) clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; very firm; slight effervescence; moderately alkaline; gradual smooth boundary.

IIC—41 to 60 inches; mottled gray (5Y 5/1) and light olive brown (2.5Y 5/4) clay; massive; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 36 to 48 inches. The depth to silty clay or clay ranges from 25 to 40 inches. The thickness of the mollic epipedon ranges from 10 to 16 inches. The depth to free carbonates ranges from 30 to 46 inches.

The Ap or A1 horizon has value of 2 or 3. The B2 horizon has value of 4 to 6 and chroma of 2 or 3 in hue of 10YR or 2.5Y. Texture is sandy loam, sandy clay loam, or clay loam. Reaction is medium acid to mildly alkaline. The texture of the C horizon is silty clay or clay.

Peotone series

The Peotone series consists of deep, very poorly drained, moderately slowly permeable soils in depressions or along major drainageways on uplands. These soils formed in silty and clayey alluvial sediments. Slope is 0 to 1 percent.

Peotone soils are similar to Ashkum, Drummer, Milford, and Sawmill soils and are commonly adjacent to Ashkum and Elliott soils. Ashkum soils have a mollic epipedon less than 24 inches thick and have glacial till in the lower B horizon and the C horizon. Drummer soils have less clay in the control section. Elliott soils are somewhat poorly drained, have a thinner mollic epipedon, and have glacial till in the middle and lower B horizon. Milford soils have a mollic epipedon less than 24 inches thick. Sawmill soils have less clay in the control section.

Typical pedon in an area of Peotone silty clay loam, 602 feet east and 1,302 feet south of northwest corner of sec. 26, T. 31 N., R. 7 E.

A1—0 to 13 inches; very dark gray (10YR 3/1) silty clay loam; weak very coarse granular structure; firm; neutral; clear smooth boundary.

A3—13 to 19 inches; very dark gray (10YR 3/1) silty clay loam; weak fine and medium granular structure; firm; few iron-manganese accumulations; neutral; clear smooth boundary.

B21g—19 to 24 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine blocky structure; firm; moderately alkaline; few iron-manganese accumulations; neutral; clear smooth boundary.

B22g—24 to 30 inches; very dark gray (5Y 3/1) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium blocky structure; very firm; many iron-manganese accumulations; mildly alkaline; gradual smooth boundary.

B23g—30 to 37 inches; dark gray (5Y 4/1) silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak coarse prismatic structure parting to moderate coarse blocky; very firm; continuous very dark gray (10YR 3/1) organic coatings; common iron-manganese accumulations; mildly alkaline; clear smooth boundary.

B3g—37 to 50 inches; gray (5Y 5/1) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse blocky structure; very firm; many iron-manganese accumulations; mildly alkaline; gradual smooth boundary.

Cg—50 to 69 inches; gray (5Y 5/1) silty clay; many fine distinct yellowish brown (10YR 5/8) mottles; massive; very firm; many iron-manganese accumulations; moderately alkaline.

The thickness of the solum ranges from 40 to 50 inches. The mollic epipedon ranges from 30 to 36 inches in thickness.

The A1 horizon has value of 2 or 3 and chroma of 1. The B2 horizon has hue of 10YR or 5Y, value of 3 or 4, and chroma of 1 or less.

Proctor series

The Proctor series consists of deep, well drained soils on upland ridges and slopes. These soils formed in about 3 feet of loamy material and the underlying loamy and sandy outwash. The subsoil is moderately permeable and the substratum moderately rapidly permeable. Slope is 0 to 5 percent.

Proctor soils are similar to Jasper soils and are commonly adjacent to Brenton and Drummer soils. Brenton soils are somewhat poorly drained. Drummer soils are poorly drained. Jasper soils have more sand in the control section.

Typical pedon in an area of Proctor silt loam, 2 to 5 percent slopes, 2,320 feet north and 290 feet west of center of sec. 14, T. 34 N., R. 6 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

A3—10 to 15 inches; dark brown (10YR 3/3) silt loam; weak very fine granular structure; friable; many very dark grayish brown (10YR 3/2) coatings on faces of peds; strongly acid; gradual smooth boundary.

B1—15 to 19 inches; dark brown (7.5YR 4/4) heavy silt loam; moderate very fine subangular blocky structure; friable; common dark brown (10YR 4/3) clay films on faces of peds; medium acid; gradual smooth boundary.

B21t—19 to 25 inches; dark brown (7.5YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; many dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

B22t—25 to 36 inches; dark brown (7.5YR 4/4) silty clay loam; moderate fine and medium subangular blocky structure; firm; many dark brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

IIB23t—36 to 40 inches; dark brown (7.5YR 4/4) silty clay loam; weak medium subangular blocky struc-

ture; firm; many dark brown (10YR 4/3) clay coatings; slightly acid; abrupt smooth boundary.
IIB3—40 to 45 inches; dark brown (7.5YR 4/2 and 7.5YR 4/4) clay loam; weak medium subangular blocky structure; very firm; slightly acid; clear smooth boundary.
IIC—45 to 60 inches; dark brown (10YR 4/3) sandy loam; massive; friable; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 40 to 55 inches. The mollic epipedon ranges from 10 to 18 inches in thickness. The depth to free carbonates ranges from 40 to more than 60 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The B2t horizon has a value of 4 or 5 and chroma of 3 or 4. Reaction is medium acid to neutral. The C horizon is sandy loam, silty loam, loam, loamy fine sand, or stratification of these textures.

Reddick series

The Reddick series consists of deep, poorly drained soils that are moderately permeable in the upper part and slowly permeable in the lower part. These soils are on broad slightly depressional areas on uplands. They formed in silty and loamy material and silty clay loam glacial till. Slope is 0 to 2 percent.

Reddick soils are similar to Ashkum, Milford, and Selma soils and are commonly adjacent to Andres soils. Andres soils are somewhat poorly drained and are somewhat higher on the landscape. Ashkum and Milford soils have more clay in the control section. Milford soils are underlain by stratified lakebed sediments. Selma soils are underlain by stratified outwash.

Typical pedon in an area of Reddick silty clay loam, 1,959 feet north and 135 feet east of southwest corner of sec. 10, T. 31 N., R. 8 E.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam; weak medium granular structure; friable; common fine roots; neutral; clear smooth boundary.
A12—7 to 10 inches; very dark gray (10YR 3/1) silty clay loam; few fine faint dark gray (10YR 4/1) mottles; weak medium granular structure; friable; common fine roots; mildly alkaline; clear smooth boundary.
B1g—10 to 14 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common medium distinct dark gray (10YR 3/1) mottles; weak coarse subangular blocky structure; firm; common fine roots; mildly alkaline; clear smooth boundary.
B21g—14 to 20 inches; grayish brown (2.5Y 5/2) clay loam; common fine faint light olive brown (2.5Y 5/4) and common fine distinct very dark gray (10YR 3/1) mottles; weak coarse subangular blocky structure; firm; mildly alkaline; clear smooth boundary.
B22g—20 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and common dark gray (10YR 4/1) mottles; moderate coarse subangular blocky structure; firm; mildly alkaline; clear smooth boundary.
B31g—25 to 32 inches; olive gray (5Y 5/2) sandy loam; common fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; mildly alkaline; abrupt smooth boundary.
IIB32g—32 to 40 inches; mixed dark yellowish brown (10YR 4/6) and gray (5Y 6/1) silty clay loam; weak coarse subangular blocky structure; firm; moderately alkaline; gradual smooth boundary.
IIC1g—40 to 56 inches; mottled dark yellowish brown (10YR 4/6) and gray (5Y 6/1) silty clay loam; massive; firm; strong effervescence; moderately alkaline; gradual smooth boundary.
IIC2—56 to 68 inches; grayish brown (2.5Y 4/2) silty clay loam; massive; firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 35 to 51 inches. The depth to free carbonates ranges from 28 to 44 inches and commonly coincides with the depth to glacial till. The mollic epipedon ranges from 10 to 15 inches in thickness.

The A horizon is silty clay loam, loam, or clay loam. The B2 horizon has value of 5 or 6 and chroma of 1 or 2 in hue of 10YR, 2.5Y, or 5Y. The upper B horizon is silty clay loam or clay loam, and the lower B horizon ranges from silty clay loam to sandy loam. Reaction of the B horizon is neutral to moderately alkaline. In some pedons the lower B horizon contains some gravel. The C horizon is silty clay loam, clay loam, or silty clay.

Ridgeville series

The Ridgeville series consists of deep, somewhat poorly drained soils on uplands. These soils formed in deep sandy and loamy outwash material. They are moderately or moderately rapidly permeable in the solum and rapidly permeable in the underlying material. Slope is 0 to 2 percent.

Ridgeville soils are similar to Darroch soils and are commonly adjacent to Ade, Gilford, and Selma soils. Ade soils are on ridges and are sandier, somewhat excessively drained, and more rapidly permeable. Darroch soils have more clay in the control section. Gilford soils are in depressions, are poorly drained, and lack argillic horizons. Selma soils are in depressions, are poorly drained, and have more clay in the control section.

Typical pedon in an area of Ridgeville fine sandy loam, 2,343 feet south and 138 feet west of northeast corner of sec. 6, T. 32 N., R. 8 E.

A11—0 to 14 inches; black (10YR 2/1) fine sandy loam; weak fine granular structure; friable; slightly acid; gradual smooth boundary.
A12—14 to 20 inches; very dark gray (10YR 3/1) fine sandy loam; common medium faint brown (10YR

5/3) mottles; weak medium subangular blocky structure; friable; medium acid; clear smooth boundary.
B1—20 to 28 inches; dark grayish brown (10YR 4/2) fine sandy loam; common fine distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; many very dark gray (10YR 3/1) coatings on faces of peds; medium acid; clear smooth boundary.
B21t—28 to 36 inches; brown (10YR 5/3) sandy loam; many fine distinct yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure; friable; continuous very dark gray (10YR 3/1) coatings on vertical faces of peds; some black (10YR 2/1) organic stains; slightly acid; clear smooth boundary.
B22t—36 to 41 inches; grayish brown (10YR 5/2) sandy loam; many fine distinct yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; friable; slightly acid; clear smooth boundary.
B3—41 to 50 inches; grayish brown (10YR 5/2) loamy sand; many fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; neutral; gradual smooth boundary.
C—50 to 60 inches; grayish brown (10YR 5/2) sand; common fine distinct yellowish brown (10YR 5/8) mottles; single grained; neutral.

The thickness of the solum ranges from 35 to 50 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The A1 horizon has value of 2 or 3 and chroma of 1 or 2. Texture is dominantly fine sandy loam but ranges to loam. The B2 horizon has value of 4 to 6 and chroma of 2 to 4 in hue of 10YR or 2.5Y. Reaction is medium acid to neutral. The C horizon ranges from loamy fine sand to sand.

Roby series

The Roby series consists of deep, somewhat poorly drained soils on uplands. These soils formed in sandy loamy outwash. The solum is moderately permeable and the underlying material moderately rapidly permeable. Slope is 0 to 2 percent.

Roby soils are similar to Ridgeville soils and are commonly adjacent to Darroch, Martinsville, Ridgeville, and Selma soils. Darroch soils have a mollic epipedon and have more clay in the control section. Martinsville soils are on ridges or slopes, are well drained, and have more clay in the control section. Ridgeville soils have a mollic epipedon. Selma soils are poorly drained and have more clay in both the A and B horizons.

Typical pedon in an area of Roby fine sandy loam, 2,079 feet east and 1,152 feet south of northwest corner of sec. 30, T. 33 N., R. 8 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable; medium acid; abrupt smooth boundary.
A2—6 to 10 inches; pale brown (10YR 6/3) loamy fine sand; weak medium platy structure; very friable; many dark grayish brown (10YR 4/2) organic stains on faces of peds; very dark gray (10YR 3/1) iron-manganese accumulations; medium acid; abrupt smooth boundary.
B1—10 to 15 inches; pale brown (10YR 6/3) loamy fine sand; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; medium acid; clear smooth boundary.
B21t—15 to 25 inches; light brownish gray (10YR 6/2) fine sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; many yellowish red (5YR 4/6) iron-manganese accumulations in lower 4 inches; medium acid; abrupt smooth boundary.
B22t—25 to 32 inches; light brownish gray (10YR 6/2) fine sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; medium acid; clear smooth boundary.
C—32 to 60 inches; stratified light brownish gray (10YR 6/2) loamy fine sand, and yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6) fine sandy loam; single grained and massive; loose and very friable; few dark brown (7.5YR 3/2) iron-manganese accumulations; medium acid.

The thickness of the solum ranges from 30 to 48 inches.

The Ap horizon has value of 3 or 4. The A2 horizon has value of 4 to 6 and chroma of 2 or 3. It is 4 to 6 inches in thickness. The B2 horizon has value of 4 to 6 and chroma of 2 to 4. Texture is dominantly fine sandy loam. Some pedons have layers of sandy clay loam or heavy fine sandy loam less than 10 inches in thickness. Reaction is strongly acid to slightly acid.

Rockton series

The Rockton series consists of moderately deep, well drained, moderately permeable soils on terrace ridges. These soils formed in loamy material over limestone bedrock. Slope ranges from 1 to 5 percent.

The mollic epipedon is thicker than is defined as the range for the Rockton series, and the soil lacks a IIB horizon formed in residuum, but these differences do not alter the use and management.

Rockton soils are similar to Jasper soils and are commonly adjacent to Channahon and Faxon soils. Channahon soils are shallower to bedrock. Faxon soils are poorly drained and are in depressions. Jasper soils have a sandy substratum.

Typical pedon in an area of Rockton silt loam, 1 to 5 percent slopes, 1,400 feet north and 72 feet east of center of sec. 34, T. 34 N., R. 8 E.

A1—0 to 16 inches; very dark brown (10YR 2/2) silt loam; weak fine granular structure; friable; neutral; clear smooth boundary.
A3—16 to 20 inches; dark brown (10YR 3/3) loam; weak medium granular structure; friable; many very dark grayish brown (10YR 3/2) coatings; neutral; clear wavy boundary.
B2t—20 to 27 inches; dark yellowish brown (10YR 4/4) light clay loam; moderate medium subangular blocky structure; firm; common very dark grayish brown (10YR 3/2) coatings on faces of peds; few flagstones; neutral; clear wavy boundary.
IICr—27 to 31 inches; yellowish brown (10YR 5/4) weathered limestone; strong effervescence; moderately alkaline; abrupt smooth boundary.
IIR—31 inches; calcareous limestone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The thickness of the mollic epipedon ranges from 12 to 20 inches.

The A horizon has a chroma of 1 or 2. It is dominantly silt loam, but the range includes loam. The B horizon has value of 4 or 5 and chroma of 3 or 4. Textures range from light clay loam to sandy clay loam with some stoniness. The upper bedrock is fractured.

Ross series

The Ross series consists of deep, well drained soils on flood plains. These soils formed in deep stratified sandy and loamy alluvial deposits. They have a moderately permeable subsoil and a moderately rapidly permeable substratum. Slope is 0 to 2 percent.

Ross soils are commonly adjacent to Lawson and Sawmill soils, but are somewhat higher on the flood plain. Lawson soils are somewhat poorly drained and contain less sand in the control section. Sawmill soils are poorly drained and contain more clay in the mollic epipedon and less sand in the control section.

Typical pedon in an area of Ross silt loam, 96 feet west and 2,842 feet north of southeast corner of sec. 10, T. 34 N., R. 7 E.

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam; weak medium subangular blocky structure; friable; neutral; abrupt smooth boundary.
A3—10 to 25 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine and very fine subangular blocky structure; friable; mildly alkaline; clear smooth boundary.
B21—25 to 30 inches; dark brown (10YR 4/3) loam; moderate fine subangular blocky structure; continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; friable; mildly alkaline; clear smooth boundary.
B22—30 to 38 inches; brown (10YR 4/3) loam; weak medium subangular blocky structure; friable; continuous dark brown (10YR 3/3) organic coatings on faces of peds; mildly alkaline; gradual smooth boundary.
B3—38 to 53 inches; mixed brown (10YR 4/3) and dark brown (10YR 3/3) loam; weak coarse subangular blocky structure; friable; moderately alkaline; gradual smooth boundary.
C—53 to 60 inches; mixed dark yellowish brown (10YR 4/4) and dark brown (10YR 3/3) sandy loam; massive; very friable; moderately alkaline.

The thickness of the solum ranges from 27 to 56 inches. The thickness of the mollic epipedon ranges from 22 to 34 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is dominantly silt loam, but the range includes loam. The B2 horizon has value of 3 or 4 and chroma of 3 or 4. It is fine sandy loam, loam, or clay loam. Its reaction is mildly or moderately alkaline. The C horizon ranges from silty clay loam to sand.

Sawmill series

The Sawmill series consists of deep, poorly drained, moderately or moderately slowly permeable soils. These soils formed in alluvium on flood plains and upland drainageways. Slope is 0 to 2 percent.

Sawmill soils are commonly adjacent to Lawson and Ross soils, and are somewhat lower on the landscape. Lawson soils are somewhat poorly drained and have less clay in the solum. Ross soils are well drained.

Typical pedon in an area of Sawmill silty clay loam, 2,460 feet south and 108 feet west of northeast corner of sec. 19, T. 34 N., R. 8 E.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam; weak medium granular structure; firm; common fine roots; mildly alkaline; clear smooth boundary.
A12—7 to 15 inches; black (10YR 2/1) silty clay loam, weak medium subangular blocky structure; firm; common fine roots; mildly alkaline; clear smooth boundary.
A3—15 to 25 inches; very dark gray (10YR 3/1) silty clay loam; moderate fine subangular blocky structure; firm; few fine roots; mildly alkaline; gradual smooth boundary.
B21g—25 to 40 inches; dark gray (10YR 4/1) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; many very dark grayish brown (10YR 3/2) iron-manganese accumulations in lower part; few fine roots; mildly alkaline; gradual smooth boundary.
B22g—40 to 63 inches; gray (5Y 5/1) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure; firm; many dark grayish brown (10YR 3/2) iron stains on faces of peds; mildly alkaline; gradual smooth boundary.

The thickness of the solum ranges from 36 to more than 60 inches. The thickness of the mollic epipedon ranges from 24 to 35 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The B horizon has value of 4 or more and chroma of 2 or less. It is neutral or mildly alkaline in reaction. Some pedons have strata of loam and sandy loam below 40 inches.

Saybrook series

Saybrook series consists of deep, moderately well drained, moderately permeable soils on uplands. These soils formed in about 32 inches of silty material and the underlying calcareous loam till. Slope ranges from 1 to 10 percent.

Saybrook soils are similar to Proctor and Symerton soils but are commonly adjacent to Brenton and Drummer soils. Brenton soils have a stratified sandy substratum and are somewhat poorly drained. Drummer soils are poorly drained and are at lower elevations. Proctor soils are more than 40 inches deep to free carbonates. Symerton soils have more sand in the upper 20 inches of the B horizon and more clay in the till or lakebed substratum.

Typical pedon in an area of Saybrook silt loam, 1 to 5 percent slopes, 2,421 feet west and 594 feet south of center of sec. 14, T. 34 N., R. 7 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam; weak fine granular structure; friable; common roots; neutral; clear smooth boundary.

A3—10 to 14 inches; dark brown (10YR 3/3) silt loam; moderate fine granular structure; friable; common roots; neutral; clear smooth boundary.

B21t—14 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; common roots; many dark brown (10YR 3/3) clay coatings; neutral; gradual smooth boundary.

B22t—21 to 25 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; moderate fine and medium subangular blocky structure; firm; common roots; continuous dark grayish brown (10YR 4/2) clay coatings on faces of peds; slightly acid; clear smooth boundary.

B23t—25 to 32 inches; yellowish brown (10YR 5/6) silty clay loam; many fine distinct light brownish gray (10YR 6/2) mottles; moderate medium and coarse subangular blocky structure; firm; common fine roots; many dark grayish brown (10YR 4/2) clay coatings on faces of peds; neutral; abrupt smooth boundary.

IIB3—32 to 37 inches; mixed light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) loam; weak medium subangular blocky structure; firm; strong effervescence; moderately alkaline; gradual smooth boundary.

IIC—37 to 60 inches; mixed light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) loam; common fine faint light brownish gray (2.5Y 6/2) mottles; massive; firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 30 to 41 inches. The depth to free carbonates ranges from 30 to 36 inches. The thickness of the mollic epipedon ranges from 10 to 14 inches.

The Ap horizon has chroma of 1 or 2. Some pedons have a B1 horizon. Depth to calcareous loam till ranges from 30 to 40 inches. The soils in map unit 145C2 are outside the range of the Saybrook series because of the thinner mollic epipedon. This difference does not affect use and management.

Selma series

The Selma series consists of deep, poorly drained soils on uplands and terraces. These soils formed in loamy outwash. They are moderately permeable in the subsoil and are moderately or moderately rapidly permeable in the substratum. Slope is 0 to 2 percent.

Selma soils are similar to Drummer soils and are commonly adjacent to Darroch, Jasper, and Ridgeville soils. Darroch soils are somewhat poorly drained. Jasper soils are well drained. Drummer soils contain less sand in the solum. Ridgeville soils are somewhat poorly drained and have more sand in the solum.

Typical pedon in an area of Selma loam, 2,784 feet north and 72 feet east of southwest corner of sec. 20, T. 32 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) loam; weak medium granular structure; friable; neutral; abrupt smooth boundary.

A12—8 to 16 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable; neutral; clear smooth boundary.

B1g—16 to 20 inches; dark gray (5Y 4/1) loam; common fine faint grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; firm; mildly alkaline; clear smooth boundary.

B21g—20 to 30 inches; light gray (5Y 6/1) loam; few fine faint brownish yellow (10YR 6/6) mottles; moderate fine subangular blocky structure; firm; common very dark gray (10YR 3/1) organic coatings in root channels and on faces of peds; few dark brown iron-manganese accumulations; mildly alkaline; clear smooth boundary.

B22g—30 to 38 inches; light gray (5Y 6/1) clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; firm; few dark brown iron-manganese accumulations; mildly alkaline; gradual smooth boundary.

B3g—38 to 45 inches; light gray (10YR 6/1) loam; common fine distinct yellowish brown (10YR 5/6)

mottles; weak medium prismatic structure; firm; few dark brown iron patches; slight effervescence; moderately alkaline; clear smooth boundary.

C1g—45 to 54 inches; light gray (10YR 6/1) sand; few fine distinct brownish yellow (10YR 6/6) mottles; single grained; loose; slight effervescence; moderately alkaline; gradual smooth boundary.

C2—54 to 62 inches; yellowish brown (10YR 5/6) sand with thin loam and silt loam strata; common fine distinct light gray (10YR 6/1) mottles; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 35 to 55 inches. The depth to free carbonates ranges from 14 to 45 inches. The thickness of the mollic epipedon ranges from 10 to 20 inches.

The Ap horizon is loam or clay loam. The B2 horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 or 2. It is dominantly clay loam but includes sandy clay loam or heavy sandy loam. Reaction is mildly or moderately alkaline. The C horizon is sand or loamy sand with some strata of sandy loam, silt loam, or clay loam.

Shadeland series

The Shadeland series consists of moderately deep, somewhat poorly drained, moderately slowly permeable soils on river terraces. These soils formed in loamy and clayey material over interbedded sandstone and shale bedrock. They have a thicker and darker Ap horizon than is defined as the range for the Shadeland series, but these differences do not alter the use and management of the soils. Slope is 0 to 2 percent.

Shadeland soils are similar to Bryce, Calamine Variant, and High Gap soils and are commonly adjacent to these soils. Bryce soils are in depressional areas. They are poorly drained and are deeper. They have more clay in the solum. Calamine Variant soils are comparable in depth to bedrock. They are in somewhat lower positions than Shadeland soils and are poorly drained. They are more clayey than Shadeland soils. High Gap soils are on higher ridges. They are moderately well drained and are sandier.

Typical pedon in an area of Shadeland loam 964 feet east and 154 feet north of southwest corner of sec. 8, T. 33 N., R. 8 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; friable; medium acid; abrupt smooth boundary.

A2—8 to 13 inches; grayish brown (10YR 5/2) loam, light gray (10YR 7/2) dry; few fine distinct yellowish brown (10YR 5/6) and few medium faint brown (10YR 5/3) mottles; common iron-manganese accumulations; weak thick platy structure parting to weak fine granular; friable; strongly acid; clear smooth boundary.

B1—13 to 20 inches; brown (10YR 5/3) clay loam; few fine faint yellowish brown (10YR 5/8) and few fine distinct yellowish brown (10YR 5/8) mottles; grayish brown (10YR 5/2) coatings on some faces of peds; common iron-manganese accumulations; weak medium prismatic structure parting to moderate very fine subangular blocky; firm; strongly acid; clear smooth boundary.

B21t—20 to 26 inches; gray (2.5Y 6/1) clay loam; many fine prominent yellowish brown (10YR 5/6) and common fine prominent dark brown (7.5YR 4/4) mottles; continuous thick gray (5Y 5/1) coatings on faces of peds; moderate medium prismatic structure parting to moderate very fine subangular blocky; firm; strongly acid; clear smooth boundary.

B22t—26 to 34 inches; grayish brown (2.5Y 5/2) clay loam; many medium prominent yellowish brown (10YR 5/4, 10YR 5/6, and 10YR 5/8) mottles; continuous thick gray (5Y 5/1) coatings on faces of peds; strong medium prismatic structure parting to strong fine subangular blocky; firm; strongly acid; clear smooth boundary.

IIB23t—34 to 37 inches; grayish brown (2.5Y 5/2) silty clay; many medium prominent yellowish brown (10YR 5/4, 10YR 5/6, and 10YR 5/8) mottles; continuous thick dark gray (5Y 4/1) coatings on faces of peds; strong medium prismatic structure parting to strong medium subangular blocky; very firm; strongly acid; abrupt smooth boundary.

Cr—37 to 60 inches; thin, horizontally bedded, weathered, grayish green (5GY 5/1) shale and yellowish brown (10YR 5/4) sandstone; rippable; strongly acid.

The thickness of the solum ranges from 22 to 40 inches over bedrock. The thickness of the mollic epipedon ranges from 7 to 10 inches.

The Ap horizon has a value of 3 or 2 and chroma of 1 or 2. It is loam or silt loam. The A2 horizon has value of 4 or 5 and chroma of 2. Some pedons lack an A2 horizon but have a B1 horizon. The B2 horizon has value of 5 or 6 and chroma of 1 to 4. It is dominantly clay loam, but the range includes silty clay loam and silty clay. Reaction is medium or strongly acid. There are varying amounts of sandstone fragments in the lower B horizon.

Sparta series

The Sparta series consists of deep, excessively drained, rapidly permeable soils on uplands. These soils formed in deep sands. Slope ranges from 1 to 6 percent.

Sparta soils are similar to Ade soils and are commonly adjacent to Gilford, Maumee, Ridgeville, and Watseka soils. Ade soils have sandy loam bands in the lower part of the solum. Gilford soils have more clay in both the A and B horizons and are poorly drained. Maumee soils are poorly drained. Ridgeville soils are somewhat poorly

drained and have more clay in the B horizon. Watseka soils are somewhat poorly drained.

Typical pedon in an area of Sparta loamy fine sand, 1 to 6 percent slopes, 2,178 feet south and 174 feet west of northeast corner of sec. 35, T. 33 N., R. 8 E.

A1—0 to 11 inches; very dark brown (10YR 2/2) loamy fine sand; weak medium granular structure; very friable; slightly acid; clear smooth boundary.

A3—11 to 20 inches; dark grayish brown (10YR 3/2) loamy fine sand; single grained; very friable; medium acid; clear smooth boundary.

B2—20 to 40 inches; dark yellowish brown (10YR 4/4) fine sand; single grained; loose; medium acid; clear smooth boundary.

C—40 to 60 inches; yellowish brown (10YR 5/6) fine sand; common fine distinct dark grayish brown (10YR 4/2) mottles; single grained; loose; slightly acid.

The thickness of the solum ranges from 24 to about 40 inches. The thickness of the mollic epipedon ranges from 11 to 20 inches.

The A horizon has a value of 2 or 3 and chroma of 1 or 2. The B horizon has value of 4 or 5 and chroma of 3 or 4.

Starks series

The Starks series consists of deep, somewhat poorly drained soils on uplands. These soils are moderately slowly permeable in the subsoil and moderately rapidly permeable in the substratum. They formed in loamy and sandy outwash. Slope is 0 to 2 percent.

Starks soils are similar to Brenton, Darroch, and Martinsville soils and are commonly adjacent to Brenton and Martinsville soils. Brenton soils have a mollic epipedon. Darroch soils have a mollic epipedon and more sand in the control section. Martinsville soils are well drained.

Typical pedon in an area of Starks silt loam, 90 feet east and 105 feet south of center of sec. 20, T. 33 N., R. 7 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

A2—8 to 11 inches; brown (10YR 5/3) silt loam; many fine faint light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; weak coarse platy structure; friable; slightly acid; clear smooth boundary.

B21t—11 to 17 inches; brown (10YR 5/3) silty clay loam; many fine faint light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; many thin dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—17 to 27 inches; dark brown (10YR 4/3) silty clay loam; many fine distinct light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular and subangular blocky; firm; continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

IIB23t—27 to 34 inches; dark yellowish brown (10YR 4/4) clay loam; many medium distinct yellowish brown (10YR 5/6) and pale yellow (2.5Y 7/4) mottles; weak coarse prismatic structure parting to weak and moderate coarse subangular blocky; firm; continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; neutral; gradual smooth boundary.

IIB31—34 to 41 inches; dark yellowish brown (10YR 4/4) stratified sandy loam, loam, and gravelly coarse sandy loam; many fine distinct yellowish brown (10YR 5/6) and common fine distinct light olive gray (5Y 6/2) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; common very dark gray (10YR 3/1) clay films on faces of peds; common reddish yellow (5Y 6/8) gravel; neutral; gradual wavy boundary.

IIB32—41 to 47 inches; dark yellowish brown (10YR 4/4) stratified sandy loam, loam, and coarse loamy sand; many fine distinct yellowish brown (10YR 5/6) and common fine distinct gray (5Y 6/1) mottles; weak coarse subangular blocky structure; very friable; slight effervescence; mildly alkaline; gradual wavy boundary.

IIC—47 to 60 inches; light olive brown (2.5Y 5/4) stratified sandy loam, loam, and coarse sand; common fine distinct gray (5Y 6/1) mottles; massive; single grained in sand; very friable; 10 to 15 percent gravel in sand textured layers; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 36 to 60 inches. The thickness of the Ap horizon ranges from 6 to 9 inches. The thickness of the A2 horizon ranges from 3 to 10 inches.

The Ap horizon has chroma of 1 or 2. It is fine sandy loam, loam, or silt loam. The A2 horizon has value of 4 to 6 and chroma of 2 or 3. It is fine sandy loam or silt loam. The B2 horizon has value of 4 to 6 and chroma of 2 to 6. It is silty clay loam in the upper part and clay loam or loam in the lower part. Reaction is strongly acid to neutral. The C horizon is stratified silty clay loam, sandy clay loam, sandy loam, or sand.

Swygert series

The Swygert series consists of deep, somewhat poorly drained, slowly permeable soils on uplands. These soils formed in glacial till or lakebed sediments. Slope ranges from 0 to 5 percent.

Swygert soils are similar to and commonly adjacent to Bryce soils and less commonly to Martinton and Milford

soils. Bryce soils are poorly drained and are in lower areas on the landscape. Martinton and Milford soils have less clay in the control section. Milford soils are poorly drained.

Typical pedon in an area of Swygert silty clay loam, 0 to 2 percent slopes, 1,908 feet north and 72 feet east of southwest corner of sec. 2, T. 34 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam; weak fine granular structure; firm; neutral; clear smooth boundary.

A3—8 to 13 inches; very dark gray (10YR 3/1) silty clay loam; few fine faint brown (10YR 5/3) mottles; moderate fine granular structure; firm; continuous black (10YR 2/1) clay films on faces of peds; neutral; clear smooth boundary.

B21t—13 to 20 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6 or 5/4) mottles; weak fine subangular blocky structure parting to moderate fine granular; firm; continuous very dark gray (10YR 3/1) clay films on faces of peds; few fine iron-manganese accumulations; neutral; clear smooth boundary.

B22t—20 to 29 inches; grayish brown (10YR 5/2) silty clay; common fine distinct yellowish brown (10YR 5/6) and common fine distinct brownish yellow (10YR 6/6) mottles; moderate medium prismatic structure; very firm; continuous mixed grayish brown (10YR 5/2) and dark gray (10YR 4/1) clay films on faces of peds; few fine iron-manganese accumulations; slight effervescence; moderately alkaline; clear smooth boundary.

B23t—29 to 44 inches; gray (10YR 6/1) silty clay; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; very firm; continuous mixed grayish brown (10YR 5/2) and dark gray (10YR 4/1) clay films on faces of peds; few fine iron-manganese accumulations; strong effervescence; moderately alkaline; gradual smooth boundary.

C1—44 to 50 inches; mixed olive gray (5Y 5/2) and gray (10YR 6/1) silty clay loam; weak coarse prismatic structure; very firm; few fine iron-manganese accumulations; violent effervescence; moderately alkaline; gradual smooth boundary.

C2—50 to 63 inches; grayish brown (10YR 5/2) silty clay loam; massive; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 32 to 50 inches. The depth to free carbonates ranges from 20 to 40 inches. The thickness of the mollic epipedon ranges from 11 to 15 inches.

The Ap horizon has a value of 2 or 3. It is dominantly silty clay loam, but the range includes silt loam, loam, sandy loam, or sandy clay loam. The B2 horizon has a value of 4 to 6 and chroma of 1 or 2. Its texture is silty clay loam or silty clay. Reaction is neutral to moderately alkaline. The C horizon is silty clay or silty clay loam.

Symerton series

The Symerton series consists of deep, moderately well drained soils on slopes and ridges in uplands. These soils formed in loamy material and glacial till or lakebed sediments. They are moderately permeable in the upper part of the solum and moderately slowly permeable in the lower solum and the substratum. Slope ranges from 1 to 10 percent.

Symerton soils are similar to Andres, Jasper, Saybrook, and Varna soils and are commonly adjacent to Elliott and Varna soils. Andres soils are somewhat poorly drained. Elliott soils have more clay in the control section, are somewhat poorly drained, and are less permeable. Jasper soils lack the underlying silty clay loam glacial till. Saybrook soils have less sand in the control section and less clay in the underlying glacial till. Varna soils have more clay in the control section and are less permeable.

Typical pedon in an area of Symerton silt loam, 1 to 5 percent slopes, 300 feet west and 510 feet north of southeast corner of sec. 9, T. 31 N., R. 6 E.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

B1—10 to 13 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear smooth boundary.

B21t—13 to 16 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and medium subangular blocky structure; friable; few very dark grayish brown (10YR 3/2) thin clay films on faces of peds; slightly acid; clear smooth boundary.

B22t—16 to 22 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium subangular blocky structure; very friable; slightly acid; clear smooth boundary.

B23t—22 to 29 inches; dark yellowish brown (10YR 4/4) clay loam; weak and moderate coarse subangular blocky structure; friable; thin clay films on faces of peds; slightly acid; clear smooth boundary.

IIB24t—29 to 33 inches; brown (10YR 5/3) silty clay loam; weak coarse subangular blocky structure; firm; grayish brown (2.5Y 5/2) thin clay films on faces of peds; neutral; abrupt smooth boundary.

IIB3t—33 to 44 inches; brown (10YR 5/3) silty clay loam; weak medium prismatic structure; very firm; many grayish brown (2.5Y 5/2) clay coatings on faces of peds; strong effervescence; mildly alkaline; gradual smooth boundary.

IIC—44 to 60 inches; mixed light olive brown (2.5Y 5/4) and dark grayish brown (2.5Y 4/2) silty clay loam; massive; very firm; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 34 to 48 inches. The depth to the underlying glacial till or lakebed sediments ranges from 22 to 46 inches. The mollic epipedon ranges from 10 to 19 inches in thickness.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is silt loam or loam. The B2 horizon has value of 4 or 5 and chroma of 3 to 6. Reaction is slightly acid in the upper part and ranges from slightly acid to moderately alkaline in the lower part. In some places the C horizon is stratified loam and sand over silty clay.

Varna series

The Varna series consists of deep, moderately well drained, moderately slowly permeable soils on uplands. These soils formed in a thin layer of silty material and the underlying silty clay loam glacial till. Slope ranges from 2 to 10 percent.

Varna soils are similar to Symerton and Morley soils and are commonly adjacent to Ashkum and Elliott soils. Ashkum soils lack argillic horizons and are in broad depressions that are poorly drained. Elliott soils are somewhat poorly drained. Morley soils lack a mollic epipedon. Symerton soils have less clay and more sand in the control section.

Typical pedon in an area of Varna silt loam, 2 to 5 percent slopes, 2,228 feet east and 294 feet north of southwest corner of sec. 7, T. 32 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; medium acid; clear smooth boundary.

A3—9 to 13 inches; very dark grayish brown (10YR 3/2) silt loam; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate medium granular structure; friable; medium acid; clear smooth boundary.

B21t—13 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; many very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

B22t—21 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong fine and medium subangular blocky structure; firm; many fine iron-manganese accumulations; continuous dark brown (10YR 4/3) thin clay films on ped faces; slightly acid; clear smooth boundary.

B23t—29 to 33 inches; brown (10YR 5/3) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; many fine iron-manganese accumulations; dark brown (10YR 4/3) clay films on faces of peds; common pebbles; slight effervescence; moderately alkaline; gradual smooth boundary.

B3—33 to 39 inches; brown (10YR 5/3) silty clay loam; few medium distinct yellowish brown (10YR 5/6) and few fine faint light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure; firm; many iron-manganese accumulations; common grayish brown (2.5Y 5/2) clay films on faces of peds; strong effervescence; moderately alkaline; gradual smooth boundary.

C—39 to 60 inches; brown (10YR 5/3) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and common fine distinct gray (5Y 6/1) mottles; massive; very firm; many iron-manganese accumulations; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 24 to 42 inches. The depth to free carbonates ranges from 24 to 36 inches. The thickness of the mollic epipedon ranges from 10 to 15 inches.

The Ap or A1 horizon has value of 2 or 3 and chroma of 1 or 2. Some pedons have a B1 horizon. The B2 horizon has value of 4 to 6 and chroma of 2 to 4. Texture is silty clay loam or silty clay. Reaction is medium acid to moderately alkaline. The soils in map unit 223C3 are outside the range of the Varna series because of the thinner mollic epipedon. This difference does not affect use and management of the soils.

Warsaw series

The Warsaw series consists of deep, well drained soils, on river terraces, that have a moderately permeable solum and very rapidly permeable underlying material. They are on ridges and formed in loamy over sandy and gravelly outwash. Slope ranges from 1 to 5 percent.

Warsaw soils are similar to Kane soils and are commonly adjacent to Gilford, Kane, and Selma soils on the same landscape. Gilford soils are in depressions, are poorly drained, and do not have gravel in the control section. Kane soils are somewhat poorly drained, have an argillic horizon, and have more clay in the control section. Selma soils are in depressions, are poorly drained, and have more clay in the control section. They have less sand and gravel in the solum.

Typical pedon in an area of Warsaw sandy loam, 1 to 5 percent slopes, 1,380 feet east and 2,100 feet south of northwest corner of sec. 29, T. 34 N., R. 8 E.

A11—0 to 13 inches; black (10YR 2/1) sandy loam; weak coarse subangular blocky structure parting to weak fine and medium granular; friable; neutral; gradual smooth boundary.

A12—13 to 20 inches; black (10YR 2/1) sandy loam; moderate coarse subangular blocky structure parting to moderate fine and medium granular; friable; neutral; clear smooth boundary.

B21t—20 to 30 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium subangular blocky structure; friable; thin very dark grayish brown (10YR 3/2) coatings on faces of some peds; 5 percent gravel; neutral; clear smooth boundary.

B22t—30 to 36 inches; dark yellowish brown (10YR 4/4) sandy clay loam; common fine faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; some clay films on faces of peds; about 5 percent gravel; mildly alkaline; clear smooth boundary.

IIC1—36 to 45 inches; mixed yellowish brown (10YR 5/4 and 10YR 5/6) gravelly loamy sand; single grained; very friable; slight effervescence; moderately alkaline.

IIC2—45 to 60 inches; yellowish brown (10YR 5/4) gravelly sand; single grained; loose; strong effervescence; moderately alkaline.

The thickness of the solum and depth to carbonates range from 25 to 40 inches. The thickness of the mollic epipedon ranges from 12 to 20 inches.

The A1 horizon has value of 2 or 3 and chroma of 1 or 2. It is loam or sandy loam. The B2 horizon has hue of 10YR and 7.5YR and value of 3 or 4. The texture is loam, sandy loam, or sandy clay loam in the upper part and gravelly loamy sand, gravelly sand, or sand in the lower part. The reaction is medium acid to moderately alkaline. The C horizon is sand, loamy sand, gravelly sand, or gravelly loamy sand.

Watseka series

The Watseka series consists of deep, somewhat poorly drained, rapidly permeable soils on uplands. These soils formed in deep sandy outwash. The slope is 0 to 2 percent.

Watseka soils are similar to Ridgeville soils and are similar and commonly adjacent to Maumee and Sparta soils. Maumee soils are poorly drained and are in depressions. Sparta soils are excessively drained. Sparta soils are slightly higher than Watseka soils. Ridgeville soils have more clay in the Ap and B horizons.

Typical pedon in an area of Watseka loamy fine sand, 2,040 feet west and 834 feet south of northeast corner of sec. 13, T. 32 N., R. 8 E.

Ap—0 to 9 inches; black (10YR 2/1) loamy fine sand; weak medium subangular blocky structure parting to weak medium granular; very friable; abundant roots; slightly acid; gradual smooth boundary.

A12—9 to 16 inches; black (10YR 2/1) loamy fine sand; weak medium subangular blocky structure parting to weak medium granular; very friable; many fine roots; medium acid; clear smooth boundary.

B1—16 to 21 inches; dark grayish brown (10YR 4/2) sand; weak fine subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

B2—21 to 30 inches; light brownish gray (10YR 6/2) sand; common fine distinct yellowish brown (10YR 5/4) mottles; single grained; neutral; clear smooth boundary.

C—30 to 60 inches; light brownish gray (10YR 6/2) sand; single grained; loose; neutral.

The thickness of the solum ranges from 29 to 36 inches. The thickness of the mollic epipedon ranges from 12 to 16 inches.

The Ap or A1 horizon has a value of 2 or 3 and a chroma of 1 or 2. It is dominantly loamy fine sand, but the range includes loamy sand. The B horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 2 or 3. It is loamy fine sand or sand.

Formation of the soils

Forty seven different kinds of soil are mapped in Grundy County. Differences among soils vary. They are attributed to at least five factors or causes: the parent material in which soil forms; the climatic conditions, especially rainfall and temperature; the plant and animal life associated with the soil, especially the native vegetation; the topography, or slope of the land surface, as it influences the moisture conditions in the soil and natural drainage; and the amount of time the processes of soil formation have been active and the rate or intensity of these processes. These major factors account for most of the differences among the soils of Grundy County. Their influence on the soil is described in the following paragraphs.

Parent material

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Parent material, the material in which soil forms, is considered to be the initial state of the soil material at the time it is deposited. In Grundy County, the geological process that produced the parent bedrock was the sedimentation of clay, sand, calcium carbonate, and organic remains, which were converted to sedimentary rocks—shale, sandstone, limestone, and coal—and then weathered to form parent material. The most common parent material in Grundy County was produced by glaciers, which covered all of northeastern Illinois about 15,000 years ago (*8*).

Related to the glacial activity were the very large quantities of water released when the glaciers melted and the wind erosion that accompanied the harsh glacial climate. During the glacial stage, the wind and flowing water caused erosion, and part of the eroded sediment was deposited in Grundy County. The wind carried sand eastward to form the sand dunes in the eastern part of the county and in Will and Kankakee Counties. Most of the water-derived sediments were transported westward by the Illinois River and deposited along the Illinois or Mississippi Rivers or in the Mississippi River delta.

More than 90 percent of Grundy County is covered with 5 feet or more of glacial and related deposits or

alluvium. These materials are called drift. They are nearly 200 feet thick in the northwestern part of the county (*5*).

In the northeast corner of the county, Elliott, Chatsworth, and related soils occur on the Minooka Moraine. The drift in the moraine is mostly Wisconsinan Till, which is silty clay loam that becomes more clayey with increasing depth. The basal unit of the till is commonly sandy. It is at the surface in only a few places. This part of the till was deposited by an earlier glacier. In places drift older than Wisconsinan till has been deposited.

The western part of the county is the back side of the Marseilles Morainic System. The upper part of the till here is older than the till in the Minooka Moraine but is very similar in composition. Ashkum, Elliott, and related soils formed in thin silty loess overlying this till. In the southeastern part of the county, Reddick and Andres soils, which are similar to Ashkum and Elliott soils, formed in the same till but have more sand in the surficial material overlying the till. This till is a silty clay loam texture in most places but becomes a silty clay to clay with increasing depth. A sandy till generally underlies the clay till, and in places it is interbedded with layers of sand and gravel. Older glacial deposits occur below 50 to 100 feet.

Soon after the glaciers retreated, nearly all of Grundy County was covered by lakes. The largest, named for Wauponsee, covered about 75 percent of the county. Glacial meltwater from the east filled the Illinois River and flooded the lowlands up to an elevation of 650 feet (*9*). This event, known as the Kankakee Flood, scoured the area along the Illinois River up to an elevation of 540 feet. In the scoured area, gravel bars and boulders were the only deposits that remained. In the areas of quiet water, sand, silt, or clay was deposited. These lakebed deposits are the Equality Formation. Where this formation occurs at the higher elevations it is only a few feet thick. These silty or sandy deposits along with a thin loess layer are the parent material of Darroch, Drummer, Jasper, Brenton, Selma, and related soils. At elevations below 620 feet there are thick deposits of the Equality Formation, commonly layers of silt and clay, where Milford and associated soils occur.

Associated with the moraines and meltwater channels are sand and gravel deposits, which are classified as outwash or the Henry Formation by the Illinois State Geological Survey. Warsaw, Hononegah, and related soils formed in these coarse deposits.

Windblown material mantles all but the areas of alluvium in Grundy County. The silty, windblown deposits are the Richland Loess. The sandy dune deposits are part of the Parkland Sand Formation. The windblown deposits grade from silt to sand from west to east. The loess is about 3 feet thick along the western border of the county and becomes thinner and more sandy to the east. The sandy dune deposit, common in the east-central part of the county, is the parent material of most of the Watseka, Ade, and associated soils. Sandy outwash deposits generally underlie the windblown sand. The thickness and texture of the windblown deposits contribute largely to the quality and variability of the soils in the county.

The flood plain and bottom land soils formed in stream deposits, the Cahokia Alluvium. Sawmill soils formed in fine-grained alluvium, and Ross soils in medium-grained alluvium. A small percentage of the soils formed in material weathered from bedrock. Faxon and related soils formed in limestone and, to a minor extent, in calcareous sandstone. The Calamine Variant and related soils formed in shale that is commonly interbedded with sandstone.

Climate

The kind and degree of weathering, which greatly affect soil profiles and their properties, are largely controlled by rainfall and temperature. Climate is also largely responsible for the type of native vegetation. The humid-temperate climate of Grundy County favors the weathering and reduction in size of soil minerals and the formation and movement of clay downward in the soil profile, especially if parent material has been in place for a long time. The prevailing rainfall has also influenced the removal, through leaching, of some of the basic elements, replacing them with hydrogen and thus imparting varying degrees of acidity to horizons of the soil profile.

Plants and animals

The vegetation that grew in Grundy County before the county was settled is responsible for some differences among soils, especially through the accumulation of organic matter and its influence on the color of the surface layer. The dark colored soils developed under native prairie grasses. The light colored soils developed under trees, dominantly oak and hickory. Some soils that developed under mixed grass and forest or were forested for only a short time before they were cleared have a moderately dark colored surface layer and an intermediate organic matter content.

Animals that live on and in the soil also influence soil formation, but generally to a lesser extent than plants. 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 apparent, except, of course, where strip mining has completely obliterated the original soil.

Topography and drainage

Topography influences water infiltration and percolation, runoff, and erosion. The moisture status of most soils in a given climate is largely controlled by topography and drainage. Where soils form in uniform, permeable, medium textured material, such as loess, natural drainage is closely related to slope. Well drained and

moderately well drained soils tend to occur in sloping areas, and somewhat poorly drained or poorly drained soils in level areas or in depressions. In areas of very permeable sandy parent material, well drained soils can occur on all slopes and in level areas unless the water table is permanently high. Conversely, in areas of slowly permeable parent material, such as shale bedrock, heavy till, or a lakebed having a high clay content, poorly drained and somewhat poorly drained soils can occur on slopes.

Level and gently sloping land surfaces, which dominate most of the upland areas in Grundy County, contribute to the formation of poorly drained and somewhat poorly drained soils that have a high water table.

On steep slopes, rainfall tends to run off before it soaks into the soil. This fact and the removal of material from steep slopes under natural conditions results in the formation of soils that have a thin solum and weakly defined horizons.

Time

Evaluating time as a factor in soil formation is difficult because of the combined influence of the other factors of soil formation. The influence of time cannot be evaluated simply in years. A young, or slightly weathered, soil and an old, or strongly weathered, soil may develop during the same period if other factors of formation differ. If other factors are similar, however, soils that have been exposed to the process of soil formation for a longer time are usually more strongly developed, or weathered, and have more strongly defined horizons.

Soils develop more rapidly in material containing low rather than high amounts of carbonate, in permeable rather than slowly permeable material, and under forest rather than grass vegetation.

The soils of Grundy County are dominantly young.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium car-

bonate) 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.

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.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Coarse fragments. Mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter.

Coarse textured soil. Sand or loamy sand.

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.

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. 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.

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.

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.

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.

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.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

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.

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.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

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.

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.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, differences in slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction 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

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

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.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can

damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	Less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

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.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

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.

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.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the low lands along 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.

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

[Data were recorded in the period 1951-75 at Gebhard Woods Pk., Ill.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	31.5	13.5	22.5	56	-17	0	1.38	.54	2.04	4	6.1
February---	35.9	17.8	26.9	59	-13	0	1.26	.52	1.84	4	3.8
March------	46.5	26.5	36.5	77	3	19	2.18	.95	3.17	5	3.6
April------	62.3	38.1	50.3	86	19	99	3.86	2.53	5.06	8	.8
May--------	73.9	48.3	61.1	94	29	359	3.77	2.12	5.11	7	.0
June-------	82.9	58.4	70.7	98	40	621	3.92	2.16	5.35	7	.0
July-------	85.4	62.0	73.8	98	47	738	3.90	2.43	5.22	7	.0
August-----	83.8	60.2	72.0	96	43	682	2.81	1.44	3.93	6	.0
September--	78.0	52.4	65.2	95	32	456	3.07	1.08	4.66	5	.0
October----	67.2	41.8	54.5	88	22	201	2.56	.87	3.90	5	.1
November---	49.9	30.5	40.2	75	8	11	1.90	1.15	2.57	5	1.6
December---	36.2	19.7	28.0	64	-13	0	1.82	.76	2.67	5	5.8
Yearly:											
Average--	61.1	39.1	50.1	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	-19	---	---	---	---	---	---
Total----	---	---	---	---	---	3,186	32.43	26.40	37.41	68	21.8

[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

[Data were recorded in the period 1951-75 at Gebhard Woods Pk., 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 19	May 4	May 16
2 years in 10 later than--	April 15	April 29	May 10
5 years in 10 later than--	April 7	April 20	April 30
First freezing temperature in fall:			
1 year in 10 earlier than--	October 19	October 6	September 26
2 years in 10 earlier than--	October 24	October 11	September 30
5 years in 10 earlier than--	November 2	October 21	October 7

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1951-75 at Gebhard Woods Pk., 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	189	162	141
8 years in 10	196	169	147
5 years in 10	208	183	159
2 years in 10	221	198	171
1 year in 10	227	205	177

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
23B	Blount silt loam, 1 to 4 percent slopes	2,570	0.9
42	Papineau sandy loam	1,370	0.5
49	Watseka loamy fine sand	2,170	0.8
69	Milford silty clay loam	9,760	3.5
73	Ross silt loam	2,020	0.7
88B	Sparta loamy fine sand, 1 to 6 percent slopes	2,570	0.9
89	Maumee loamy fine sand	1,110	0.4
91A	Swygert silty clay loam, 0 to 2 percent slopes	4,100	1.5
91B	Swygert silty clay loam, 2 to 5 percent slopes	2,050	0.7
98B	Ade loamy fine sand, 1 to 6 percent slopes	5,190	1.9
107	Sawmill silty clay loam	6,680	2.4
125	Selma loam	13,820	5.0
132	Starks silt loam	900	0.3
145B	Saybrook silt loam, 1 to 5 percent slopes	700	0.3
145C2	Saybrook silt loam, 5 to 10 percent slopes, eroded	240	0.1
146A	Elliott silt loam, 0 to 2 percent slopes	25,030	9.1
146B	Elliott silt loam, 2 to 5 percent slopes	2,210	0.8
148A	Proctor silt loam, 0 to 2 percent slopes	830	0.3
148B	Proctor silt loam, 2 to 5 percent slopes	2,900	1.0
149	Brenton silt loam	11,850	4.3
151	Ridgeville fine sandy loam	5,630	2.0
152	Drummer silty clay loam	30,270	11.0
184	Roby fine sandy loam	1,080	0.4
189A	Martinton silt loam, 0 to 3 percent slopes	5,980	2.1
194B	Morley silt loam, 2 to 5 percent slopes	1,150	0.4
194C3	Morley silty clay loam, 5 to 10 percent slopes, severey eroded	500	0.2
201	Gilford fine sandy loam	4,220	1.5
223B	Varna silt loam, 2 to 5 percent slopes	1,640	0.6
223C3	Varna silty clay loam, 5 to 10 percent slopes, severely eroded	1,250	0.4
228A	Nappanee silt loam, 0 to 2 percent slopes	560	0.2
228B	Nappanee silt loam, 2 to 5 percent slopes	1,120	0.4
232	Ashkum silty clay loam	22,130	8.0
235	Bryce silty clay	5,050	1.8
241G	Chatsworth silt loam, 15 to 50 percent slopes	2,780	1.0
290B	Warsaw sandy loam, 1 to 5 percent slopes	940	0.3
293	Andres silt loam	11,800	4.2
294B	Symerton silt loam, 1 to 5 percent slopes	3,030	1.1
294C2	Symerton silt loam, 5 to 10 percent slopes, eroded	310	0.1
315B	Channahon loam, 1 to 4 percent slopes	1,190	0.4
330	Peotone silty clay loam	1,760	0.6
343	Kane silt loam	420	0.2
354B	Hononegah loamy sand, 1 to 5 percent slopes	1,680	0.6
354C	Hononegah loamy sand, 5 to 15 percent slopes	890	0.3
392	Urban land-Orthents complex	2,750	1.0
439A	Jasper silt loam, sandy substratum, 0 to 2 percent slopes	920	0.3
439B	Jasper silt loam, sandy substratum, 2 to 6 percent slopes	1,150	0.4
451	Lawson silt loam	4,870	1.7
503B	Rockton silt loam, 1 to 5 percent slopes	1,160	0.4
516	Faxon silty clay loam	1,100	0.4
536	Dumps	390	0.1
553	Bryce-Calamine variant complex	4,480	1.6
555	Shadeland loam	4,300	1.5
556B	High Gap loam, 1 to 5 percent slopes	1,690	0.6
570B	Martinsville loam, 1 to 5 percent slopes	810	0.3
570C	Martinsville loam, 5 to 10 percent slopes	430	0.2
594	Reddick silty clay loam	27,290	9.9
740	Darroch silt loam	5,950	2.1
776	Comfrey loam	1,310	0.5
802D	Orthents, loamy, rolling	810	0.3
802G	Orthents, loamy, very steep	6,130	2.2
811	Aquolls	1,600	0.6
863	Pits, clay	410	0.1
865	Pits, gravel	290	0.1
1107	Sawmill silty clay loam, wet	910	0.3
	Water	6,200	2.2
	Total	278,400	100.0

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	Grass-legume hay	Bromegrass-alfalfa	Kentucky bluegrass
	Bu	Bu	Bu	Ton	AUM*	AUM*
23B---------- Blount	95	32	42	3.9	---	---
42---------- Papineau	110	37	48	4.3	---	---
49---------- Watseka	80	28	37	3.4	6.0	---
69---------- Milford	115	40	48	4.8	---	---
73---------- Ross	130	44	50	5.5	---	---
88B---------- Sparta	50	---	---	2.5	---	2.0
89---------- Maumee	110	38	50	3.6	---	---
91A---------- Swygert	99	35	44	4.1	---	---
91B---------- Swygert	95	32	40	3.9	---	---
98B---------- Ade	75	26	34	2.5	---	---
107---------- Sawmill	125	41	46	4.9	---	---
125---------- Selma	118	40	46	4.5	---	---
132---------- Starks	112	36	48	4.6	---	---
145B---------- Saybrook	119	41	51	5.0	8.4	---
145C2---------- Saybrook	111	38	46	4.6	7.7	---
146A---------- Elliott	110	38	47	4.6	7.2	---
146B---------- Elliott	105	34	43	4.4	7.0	---
148A---------- Proctor	125	40	51	5.0	8.3	---
148B---------- Proctor	123	39	51	4.9	8.2	---
149---------- Brenton	139	43	---	5.4	8.5	---
151---------- Ridgeville	100	36	46	4.2	7.0	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Winter wheat	Grass-legume hay	Bromegrass-alfalfa	Kentucky bluegrass
	Bu	Bu	Bu	Ton	AUM*	AUM*
152---------- Drummer	135	45	50	5.0	8.2	---
184---------- Roby	85	30	39	3.7	6.1	---
189A---------- Martinton	117	41	50	4.8	7.5	---
194B---------- Morley	90	33	41	3.6	6.2	---
194C3---------- Morley	68	---	26	2.6	4.3	---
201---------- Gilford	120	42	54	4.0	---	---
223B---------- Varna	101	37	46	4.3	6.8	---
223C3---------- Varna	80	22	29	3.4	5.5	---
228A---------- Nappanee	90	32	37	3.5	---	---
228B---------- Nappanee	80	28	33	3.5	---	---
232---------- Ashkum	115	40	48	4.8	---	---
235---------- Bryce	104	39	42	4.0	---	---
241G---------- Chatsworth	---	---	---	1.4	2.3	---
290B---------- Warsaw	95	33	48	3.1	---	---
293---------- Andres	126	45	55	5.0	8.0	---
294B---------- Symerton	118	40	51	4.9	8.0	---
294C2---------- Symerton	110	32	45	4.6	7.5	---
315B---------- Channahon	61	23	31	2.8	4.8	---
330---------- Peotone	113	43	---	4.5	---	---
343---------- Kane	106	39	48	4.4	7.2	---
354B---------- Hononegah	67	21	28	3.0	5.0	---
354C---------- Hononegah	---	---	---	2.6	4.2	---
392. Urban land						

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	Grass-legume hay	Bromegrass-alfalfa	Kentucky bluegrass
	Bu	Bu	Bu	Ton	AUM*	AUM*
439A---------- Jasper	125	44	50	4.1	7.8	---
439B---------- Jasper	120	42	48	4.0	7.5	---
451---------- Lawson	110	---	---	4.0	---	3.5
503B---------- Rockton	90	26	---	4.0	5.6	3.0
516---------- Faxon	---	---	---	---	---	---
536**. Dumps						
553---------- Bryce-Calamine variant	---	---	---	---	---	---
555---------- Shadeland	100	35	50	3.3	---	---
556B---------- High Gap	85	32	45	3.0	---	---
570B---------- Martinsville	120	42	48	4.0	---	---
570C---------- Martinsville	110	38	44	3.6	---	---
594---------- Reddick	110	38	48	4.5	---	---
740---------- Darroch	130	46	52	4.3	---	---
776---------- Comfrey	85	34	---	3.5	---	---
802D**, 802G**. Orthents						
811**. Aquolls						
863**, 865**. Pits						
1107---------- Sawmill	---	---	---	---	---	---

* 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	
23B---------- Blount	3o	Slight	Slight	Slight	Slight	White oak----------	65	Eastern white pine, eastern redcedar, red pine.
						Northern red oak----	65	
						Green ash----------	---	
						Bur oak----------	---	
						Pin oak----------	---	
42---------- Papineau	---	---	---	---	---		---	Eastern white pine, red pine, green ash, bur oak.
49---------- Watseka	---	---	---	---	---		---	Eastern white pine, red pine, eastern redcedar.
69---------- Milford	---	---	---	---	---		---	Pin oak, green ash, eastern hemlock, Norway spruce, red maple.
73---------- Ross	2o	Slight	Slight	Slight	Slight	White oak----------	85	Eastern white pine, black walnut, white ash, Norway spruce.
						Sugar maple----------	85	
88B---------- Sparta	3s	Slight	Slight	Severe	Slight	Northern red oak----	70	Eastern white pine, red pine, jack pine.
						Red pine----------	---	
						Eastern white pine--	---	
						Jack pine----------	---	
89---------- Maumee	4w	Slight	Severe	Slight	Severe	Pin oak----------	70	European larch, Norway spruce, white spruce.
						Bigtooth aspen------	70	
						Silver maple--------	---	
91A, 91B---------- Swygert	---	---	---	---	---		---	Black spruce, green ash, European larch, pin oak.
98B---------- Ade	---	---	---	---	---		---	Eastern white pine, red pine, jack pine.
107---------- Sawmill	---	---	---	---	---		---	Black spruce, green ash, pin oak, European larch.
125---------- Selma	---	---	---	---	---		---	Pin oak, green ash, European larch, black spruce.
132---------- Starks	2o	Slight	Slight	Slight	Slight	White oak----------	80	American sycamore, white oak, green ash, sugar maple.
						Northern red oak----	80	
						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	
145B, 145C2-------- Saybrook	---	---	---	---	---		---	Black walnut, green ash, red maple, bur oak, eastern white pine, red pine.
146A, 146B--------- Elliott	---	---	---	---	---		---	White oak, northern red oak, green ash, sugar maple, eastern white pine.
148A, 148B--------- Proctor	---	---	---	---	---		---	Black walnut, green ash, red maple, eastern white pine, red pine.
149---------- Brenton	---	---	---	---	---		---	Eastern cottonwood, American sycamore, white oak, northern red oak, green ash, sugar maple.
151---------- Ridgeville	---	---	---	---	---		---	Eastern white pine, eastern redcedar, red pine.
152---------- Drummer	---	---	---	---	---		---	Eastern cottonwood, American sycamore, red maple, green ash, pin oak.
184---------- Roby	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black walnut--------	80 80 ---	Black walnut, eastern cottonwood, American sycamore, white oak, eastern white pine.
189A---------- Martinton	---	---	---	---	---		---	Eastern white pine, red pine, eastern redcedar.
194B, 194C3-------- Morley	2o	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black walnut-------- Bur oak---------- Northern red oak---- Shagbark hickory----	80 80 --- --- --- ---	White oak, black walnut, green ash, eastern white pine, Norway spruce, red pine, white spruce.
201---------- Gilford	4w	Slight	Severe	Severe	Severe	Pin oak---------- Eastern white pine-- Bigtooth aspen------ Red maple----------	70 75 70 70	European larch, white spruce, green ash.

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	
223B, 223C3--------- Varna	---	---	---	---	---		---	White oak, black walnut, northern red oak, green ash, sugar maple, eastern white pine.
228A, 228B--------- Nappanee	3o	Slight	Slight	Slight	Slight	White oak---------- Pin oak---------- American sycamore--- Blackgum----------	75 85 --- ---	Eastern white pine, baldcypress, green ash, red maple, American sycamore.
235---------- Bryce	---	---	---	---	---		---	Eastern cottonwood, pin oak, American sycamore, red maple, green ash.
241G--------- Chatsworth	4c	Moderate	Moderate	Severe	Severe	White oak---------- Northern red oak----	60 60	White oak, eastern white pine, eastern redcedar, green ash.
290B--------- Warsaw	---	---	---	---	---		---	Eastern white pine, Norway spruce, red pine, white ash.
293---------- Andres	---	---	---	---	---		---	White oak, northern red oak, green ash, sugar maple, red pine.
294B, 294C2-------- Symerton	---	---	---	---	---		---	White oak, black walnut, northern red oak, green ash, sugar maple, eastern white pine.
315B--------- Channahon	---	---	---	---	---		---	Eastern redcedar, eastern white pine, red pine.
330---------- Peotone	---	---	---	---	---		---	Pin oak, green ash, red maple.
343---------- Kane	---	---	---	---	---		---	American sycamore, eastern cottonwood, green ash, eastern white pine, bur oak, common hackberry.
354B, 354C--------- Hononegah	---	---	---	---	---		---	Green ash, eastern white pine, red pine, American sycamore, common hackberry, bur oak.

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	
439A, 439B--------- Jasper	---	---------	---------	---------	---------		---	Eastern white pine, red pine, white ash, black walnut, black locust.
451---------------- Lawson	4o	Slight	Slight	Slight	Slight	Eastern cottonwood-- White ash---------- American elm---------	80 --- ---	White spruce, silver maple, white ash.
553*: Bryce-----------	---	---------	---------	---------	---------		---	Eastern cottonwood, pin oak, American sycamore, red maple, green ash.
Calamine variant--	---	---------	---------	---------	---------		---	Eastern cottonwood, pin oak, American sycamore, red maple.
555---------------- Shadeland	2o	Slight	Slight	Slight	Slight	White oak---------- Pin oak----------	75 85	Eastern white pine, white ash, red maple, American sycamore.
556B--------------- High Gap	2o	Slight	Slight	Slight	Slight	White oak----------	75	Eastern white pine, red pine, jack pine.
570B, 570C--------- Martinsville	1o	Slight	Slight	Slight	Slight	White oak----------	90	Eastern white pine, red pine, white ash, black walnut, black locust.
594---------------- Reddick	---	---------	---------	---------	---------		---	Eastern cottonwood, pin oak, American sycamore, red maple, swamp white oak, green ash.
740---------------- Darroch	---	---------	---------	---------	---------		---	Eastern white pine, white ash, red maple, American sycamore.
1107--------------- Sawmill	---	---------	---------	---------	---------		---	Black spruce, green ash, pin oak, European larch.

* 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
23B---------- Blount	Redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive, Amur honeysuckle.	Russian-olive, eastern redcedar, Amur maple.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood.
42---------- Papineau	Gray dogwood, redosier dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood.
49---------- Watseka	Gray dogwood, Vanhoutte spirea.	Autumn-olive, eastern redcedar.	Norway spruce, eastern white pine.	---	---
69---------- Milford	Gray dogwood, redosier dogwood.	Silky dogwood, Amur honeysuckle.	Northern white-cedar, Russian-olive, baldcypress.	Green ash, Norway spruce.	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.	Eastern cottonwood, American sycamore.
88B---------- Sparta	Vanhoutte spirea, gray dogwood.	Autumn-olive, eastern redcedar.	Norway spruce, eastern white pine.	---	---
89---------- Maumee	Gray dogwood, redosier dogwood.	Silky dogwood, Amur maple.	Northern white-cedar, baldcypress, green ash.	Pin oak, red maple.	---
91A, 91B---------- Swygert	Redosier dogwood, gray dogwood.	Amur maple, silky dogwood, Amur honeysuckle.	Northern white-cedar, Russian-olive, baldcypress.	Norway spruce, green ash.	Eastern cottonwood, pin oak.
98B---------- Ade	Vanhoutte spirea, gray dogwood.	Autumn-olive, eastern redcedar.	Norway spruce, eastern white pine.	---	---
107---------- Sawmill	Redosier dogwood, gray dogwood.	Silky dogwood, Amur maple.	Northern white-cedar, Russian-olive, baldcypress.	Green ash, Norway spruce.	Eastern cottonwood, pin oak.
125---------- Selma	Redosier dogwood, gray dogwood.	Amur maple, silky dogwood.	Northern white-cedar, Russian-olive, baldcypress.	Norway spruce, green ash.	Eastern cottonwood, pin oak.
132---------- Starks	Gray dogwood, redosier dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
145B, 145C2------- Saybrook	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.
146A, 146B-------- Elliott	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.
148A, 148B-------- Proctor	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.

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
149---------- Brenton	Redosier dogwood, gray dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
151---------- Ridgeville	Gray dogwood, redosier dogwood.	Autumn-olive, silky dogwood, Amur honeysuckle.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
152---------- Drummer	Gray dogwood, redosier dogwood.	Silky dogwood, Amur honeysuckle, Amur maple.	Northern white-cedar, Russian-olive, baldcypress.	Green ash, Norway spruce.	Eastern cottonwood, pin oak.
184---------- Roby	Redosier dogwood, gray dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
189A---------- Martinton	Redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive, Amur honeysuckle.	Russian-olive, eastern redcedar.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
194B, 194C3------- Morley	Redosier dogwood, gray dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	Eastern redcedar, Russian-olive.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
201---------- Gilford	Gray dogwood, redosier dogwood.	Silky dogwood, Amur maple.	Northern white-cedar, baldcypress, green ash.	Pin oak, red maple.	---
223B, 223C3------- Varna	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.
228A, 228B-------- Nappanee	Silky dogwood, redosier dogwood.	Silky dogwood, Amur maple.	Northern white-cedar, baldcypress, green ash.	Pin oak, red maple.	---
232---------- Ashkum	Gray dogwood, redosier dogwood.	Silky dogwood, Amur honeysuckle, Amur maple.	Northern white-cedar, Russian-olive, baldcypress.	Norway spruce, green ash.	Eastern cottonwood, pin oak.
235---------- Bryce	---	Jack pine, eastern redcedar, hawthorn.	---	---	---
241G---------- Chatsworth	---	Jack pine, eastern redcedar, hawthorn.	---	---	---
290B---------- Warsaw	Redosier dogwood, gray dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	Eastern redcedar, Russian-olive.	Norway spruce, eastern white pine, Douglas-fir.	Eastern cottonwood, American sycamore.
293---------- Andres	Gray dogwood, redosier dogwood.	Autumn-olive, Amur honeysuckle, silky dogwood.	Russian-olive, eastern redcedar.	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.	Eastern cottonwood, American sycamore.

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
315B---------- Channahon	Redosier dogwood, gray dogwood, Vanhoutte spirea.	Autumn-olive, silky dogwood.	Jack pine, eastern redcedar.	---	---
330---------- Peotone	Gray dogwood, redosier dogwood.	Silky dogwood, baldcypress.	Green ash---------	Black spruce------	---
343---------- Kane	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.
354B, 354C-------- Hononegah	Vanhoutte spirea, gray dogwood.	Autumn-olive, eastern redcedar.	Norway spruce, eastern white pine.	---	---
392*. Urban land					
439A, 439B-------- Jasper	Redosier dogwood, gray dogwood.	Amur honeysuckle, autumn-olive, silky dogwood.	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.	Eastern cottonwood, American sycamore.
503B---------- Rockton	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, eastern redcedar.	Eastern white pine, Norway spruce, Douglas-fir.	Eastern cottonwood, American sycamore.
516---------- Faxon	Redosier dogwood, gray dogwood.	Amur honeysuckle, silky dogwood, autumn-olive.	Russian-olive, eastern redcedar.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
536*. Dumps					
553*: Bryce---------- Calamine variant.	---	Jack pine, eastern redcedar, hawthorn.	---	---	---
555---------- Shadeland	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.
556B---------- High Gap	Redosier dogwood, gray dogwood.	Silky dogwood, autumn-olive, Amur honeysuckle.	Eastern redcedar, Russian-olive.	Norway spruce, Douglas-fir, eastern white pine.	Eastern cottonwood, American sycamore.
570B, 570C-------- 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.
594---------- Reddick	Redosier dogwood, gray dogwood.	Silky dogwood, Amur maple, Amur honeysuckle.	Northern white-cedar, Russian-olive, baldcypress.	Norway spruce, green ash.	Eastern cottonwood, pin oak.
740---------- Darroch	Redosier dogwood, gray dogwood.	Silky dogwood, Amur honeysuckle, autumn-olive.	Russian-olive, northern white-cedar.	Norway spruce, eastern white pine, 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
776---------- Comfrey	Redosier dogwood, gray dogwood.	Silky dogwood, baldcypress.	Green ash---------	Black spruce------	---
802D*, 802G*. Orthents					
811*. Aquolls					
863*, 865*. Pits					
1107---------- Sawmill	Redosier dogwood, gray dogwood.	Silky dogwood, baldcypress.	Green ash---------	Black spruce------	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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
23B---------- Blount	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
42---------- Papineau	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
49---------- Watseka	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, too sandy.
69---------- Milford	Severe: wetness, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: low strength, wetness, floods.	Severe: wetness.
73---------- Ross	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: low strength, floods.	Moderate: floods.
88B---------- Sparta	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: too sandy.
89---------- Maumee	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
91A, 91B---------- Swygert	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, wetness.	Severe: frost action, shrink-swell, low strength.	Moderate: too clayey, wetness.
98B---------- Ade	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: too sandy.
107---------- Sawmill	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods.
125---------- Selma	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, frost action, floods.	Severe: wetness.
132---------- Starks	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength, wetness.	Moderate: wetness.
145B---------- Saybrook	Slight---------	Slight---------	Moderate: wetness.	Slight---------	Severe: frost action, low strength.	Slight.
145C2---------- Saybrook	Slight---------	Slight---------	Moderate: wetness, low strength.	Moderate: slope.	Severe: frost action, low strength.	Slight.
146A, 146B-------- Elliott	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
148A, 148B-------- Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: frost action, low strength.	Slight.
149---------- Brenton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.

TABLE 8.--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
151---------- Ridgeville	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
152---------- Drummer	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
184---------- Roby	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
189A--------- Martinton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
194B--------- Morley	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell.	Severe: low strength.	Slight.
194C3-------- Morley	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: too clayey.
201---------- Gilford	Severe: wetness, cutbanks cave, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, frost action, floods.	Severe: wetness, floods.
223B, 223C3------- Varna	Slight---------	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
228A, 228B-------- Nappanee	Severe: wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: low strength, shrink-swell.	Moderate: wetness.
232---------- Ashkum	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
235---------- Bryce	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, low strength, floods.	Severe: too clayey, wetness.
241G--------- Chatsworth	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
290B--------- Warsaw	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Severe: low strength.	Slight.
293---------- Andres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
294B, 294C2------- Symerton	Moderate: wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell.	Severe: low strength.	Slight.
315B--------- Channahon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
330---------- Peotone	Severe: wetness, floods.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, shrink-swell.	Severe: wetness, floods, low strength.	Severe: wetness.

TABLE 8.--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
343--- Kane	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
354B--- Hononegah	Severe: cutbanks cave.	Slight---	Slight---	Slight---	Slight---	Moderate: too sandy.
354C--- Hononegah	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: too sandy, slope.
392*. Urban land.						
439A--- Jasper	Severe: cutbanks cave.	Slight---	Slight---	Slight---	Severe: low strength.	Slight.
439B--- 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.
503B--- Rockton	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Moderate: thin layer.
516--- Faxon	Severe: wetness, floods, depth to rock.	Severe: wetness, floods.	Severe: wetness, floods, depth to rock.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods.
536*. Dumps						
553*: Bryce---	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, low strength, floods.	Severe: wetness.
Calamine variant-	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: low strength, wetness, floods.	Severe: too clayey, wetness.
555--- Shadeland	Severe: depth to rock, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: small stones, wetness.
556B--- High Gap	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Severe: low strength.	Moderate: thin layer.
570B--- Martinsville	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
570C--- Martinsville	Slight---	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
594--- Reddick	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action, low strength.	Severe: wetness.

See footnote at end of table.

TABLE 8.--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
740---------- Darroch	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, low strength.	Moderate: wetness.
776---------- Comfrey	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness.
802D*, 802G*. Orthents						
811*. Aquolls						
863*, 865*. Pits						
1107---------- Sawmill	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, low strength.	Severe: wetness, floods.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--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
23B Blount	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
42 Papineau	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
49 Watseka	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness, seepage.
69 Milford	Severe: wetness, percs slowly, floods.	Severe: floods, wetness.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: wetness, too clayey.
73 Ross	Severe: floods.	Severe: floods, seepage.	Severe: floods, wetness, seepage.	Severe: floods, seepage.	Good.
88B Sparta	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
89 Maumee	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: wetness, seepage, too sandy.
91A Swygert	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
91B Swygert	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, wetness.
98B Ade	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: too sandy, seepage.
107 Sawmill	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
125 Selma	Severe: wetness, floods.	Severe: seepage, wetness.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Poor: wetness.
132 Starks	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
145B Saybrook	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
145C2 Saybrook	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

TABLE 9.--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
146A, 146B---------- Elliott	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
148A, 148B---------- Proctor	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
149---------- Brenton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
151---------- Ridgeville	Severe: wetness.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: wetness.
152---------- Drummer	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
184---------- Roby	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: wetness.
189A---------- Martinton	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness.
194B---------- Morley	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: too clayey, wetness.	Slight----------	Fair: too clayey.
194C3---------- Morley	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: too clayey, wetness.	Slight----------	Fair: too clayey.
201---------- Gilford	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: wetness, seepage, floods.	Severe: wetness, seepage, floods.	Poor: wetness.
223B---------- Varna	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: wetness, too clayey.	Slight----------	Fair: too clayey.
223C3---------- Varna	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness, too clayey.	Slight----------	Fair: too clayey.
228A---------- Nappanee	Severe: percs slowly, wetness.	Slight----------	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
228B---------- Nappanee	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: too clayey.
232---------- Ashkum	Severe: percs slowly, wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
235---------- Bryce	Severe: wetness, percs slowly, floods.	Slight----------	Severe: wetness, too clayey, floods.	Severe: wetness, floods.	Poor: too clayey, wetness.

TABLE 9.--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
241G---------- Chatsworth	Severe: percs slowly, slope, wetness.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope.
290B---------- Warsaw	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: small stones.
293---------- Andres	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
294B---------- Symerton	Severe: percs slowly.	Moderate: slope, wetness, seepage.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
294C2---------- Symerton	Severe: percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
315B---------- Channahon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
330---------- Peotone	Severe: percs slowly, wetness, floods.	Slight----------	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: wetness, too clayey.
343---------- Kane	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, seepage, wetness.
354B---------- Hononegah	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
354C---------- Hononegah	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
392*. Urban land					
439A, 439B---------- Jasper	Slight----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
451---------- Lawson	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
503B---------- Rockton	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Poor: area reclaim.
516---------- Faxon	Severe: wetness, depth to rock, floods.	Severe: wetness, depth to rock, floods.	Severe: wetness, depth to rock, floods.	Severe: wetness, floods.	Poor: wetness, area reclaim.
536*. Dumps					

See footnote at end of table.

TABLE 9.--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
553*: Bryce	Severe: wetness, percs slowly, floods.	Slight	Severe: floods, depth to rock, wetness.	Severe: wetness, floods.	Poor: too clayey, wetness.
Calamine variant	Severe: floods, wetness, percs slowly.	Severe: depth to rock.	Severe: floods, depth to rock, wetness.	Severe: floods, wetness.	Poor: area reclaim, too clayey, wetness.
555--- Shadeland	Severe: wetness, depth to rock, percs slowly.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: area reclaim, wetness.
556B--- High Gap	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: area reclaim.
570B--- Martinsville	Slight	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
570C--- Martinsville	Slight	Severe: slope.	Slight	Slight	Fair: too clayey.
594--- Reddick	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
740--- Darroch	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
776--- Comfrey	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
802D*, 802G*. Orthents					
811*. Aquolls					
863*, 865*. Pits					
1107--- Sawmill	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
23B---------- Blount	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
42---------- Papineau	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
49---------- Watseka	Poor: wetness.	Good----------	Unsuited: excess fines.	Fair: too sandy.
69---------- Milford	Poor: wetness, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
73---------- Ross	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Good.
88B---------- Sparta	Good----------	Fair: excess fines.	Unsuited: excess fines.	Fair: too sandy.
89---------- Maumee	Poor: wetness.	Good----------	Unsuited: excess fines.	Poor: wetness.
91A, 91B---------- Swygert	Poor: shrink-swell, low strength	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
98B---------- Ade	Good----------	Good----------	Unsuited: excess fines.	Fair: too sandy.
107---------- Sawmill	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
125---------- Selma	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
132---------- Starks	Poor: low strength, wetness.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
145B, 145C2---------- Saybrook	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
146A, 146B---------- Elliott	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
148A, 148B---------- Proctor	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
149---------- Brenton	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
151---------- Ridgeville	Poor: wetness.	Fair: excess fines.	Unsuited: excess fines.	Good.
152---------- Drummer	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
184---------- Roby	Poor: wetness.	Fair: excess fines.	Poor: excess fines.	Fair: thin layer.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
189A---------- Martinton	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
194B---------- Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
194C3---------- Morley	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
201---------- Gilford	Poor: wetness.	Good----------	Unsuited: excess fines.	Poor: wetness.
223B, 223C3---------- Varna	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
228A, 228B---------- Nappanee	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
232---------- Ashkum	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
235---------- Bryce	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
241G---------- Chatsworth	Poor: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, slope.
290B---------- Warsaw	Fair: low strength.	Good----------	Good----------	Good.
293---------- Andres	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
294B, 294C2---------- Symerton	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
315B---------- Channahon	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: area reclaim.
330---------- Peotone	Poor: shrink-swell, wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
343---------- Kane	Poor: wetness.	Good----------	Good----------	Fair: thin layer.
354B---------- Hononegah	Good----------	Good----------	Good----------	Fair: too sandy.
354C---------- Hononegah	Good----------	Good----------	Good----------	Fair: too sandy, slope.
392*. Urban land				
439A, 439B---------- Jasper	Poor: low strength.	Fair: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
451---------- Lawson	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
503B---------- Rockton	Poor: low strength, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: area reclaim, thin layer.
516---------- Faxon	Poor: wetness, low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
536*. Dumps				
553*: Bryce----------	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Calamine variant-----	Poor: low strength, wetness, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.
555---------- Shadeland	Poor: low strength, thin layer, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
556B---------- High Gap	Poor: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, area reclaim.
570B, 570C---------- Martinsville	Fair: low strength.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
594---------- Reddick	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
740---------- Darroch	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
776---------- Comfrey	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
802D*, 802G*. Orthents				
811*. Aquolls				
863*, 865*. Pits				
1107---------- Sawmill	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
23B---------- Blount	Favorable------	Wetness--------	Percs slowly, frost action.	Wetness, erodes easily, percs slowly.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.
42---------- Papineau	Favorable------	Hard to pack, wetness.	Percs slowly, frost action.	Wetness, soil blowing, percs slowly.	Not needed-----	Wetness, percs slowly.
49---------- Watseka	Seepage--------	Piping, seepage.	Favorable------	Wetness, droughty, fast intake.	Not needed-----	Wetness, droughty.
69---------- Milford	Favorable------	Wetness--------	Floods, frost action.	Wetness, slow intake, floods.	Not needed-----	Wetness.
73---------- Ross	Seepage--------	Piping---------	Not needed-----	Floods---------	Not needed-----	Favorable.
88B---------- Sparta	Seepage--------	Piping, seepage.	Not needed-----	Fast intake, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
89---------- Maumee	Seepage--------	Seepage, wetness.	Favorable------	Wetness, fast intake, droughty.	Not needed-----	Wetness, droughty.
91A---------- Swygert	Favorable------	Hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Not needed-----	Percs slowly, wetness, erodes easily.
91B---------- Swygert	Favorable------	Hard to pack, wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Percs slowly, wetness, erodes easily.
98B---------- Ade	Seepage--------	Seepage--------	Not needed-----	Droughty, soil blowing, fast intake.	Too sandy, soil blowing.	Droughty.
107---------- Sawmill	Favorable------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
125---------- Selma	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
132---------- Starks	Seepage--------	Wetness--------	Frost action---	Wetness, erodes easily.	Not needed-----	Wetness, erodes easily.
145B---------- Saybrook	Seepage--------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
145C2---------- Saybrook	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.
146A---------- Elliott	Favorable------	Wetness, hard to pack.	Frost action---	Wetness--------	Not needed-----	Wetness.
146B---------- Elliott	Favorable------	Wetness, hard to pack.	Frost action---	Wetness--------	Wetness--------	Wetness.
148A---------- Proctor	Seepage--------	Favorable------	Not needed-----	Favorable------	Favorable------	Erodes easily.
148B---------- Proctor	Seepage--------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
149---------- Brenton	Seepage--------	Wetness--------	Frost action---	Wetness--------	Not needed-----	Wetness, erodes easily.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
151---------- Ridgeville	Seepage---------	Seepage---------	Frost action---	Wetness, soil blowing.	Not needed-----	Wetness.
152---------- Drummer	Seepage---------	Wetness---------	Frost action, floods.	Wetness, floods.	Not needed-----	Wetness.
184---------- Roby	Seepage---------	Seepage, wetness, piping.	Frost action---	Wetness, soil blowing.	Not needed-----	Wetness.
189A---------- Martinton	Favorable------	Wetness---------	Percs slowly, frost action.	Wetness, percs slowly.	Not needed-----	Wetness, erodes easily, percs slowly.
194B---------- Morley	Favorable------	Favorable------	Not needed-----	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
194C3---------- Mkrley	Favorable------	Favorable------	Not needed-----	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
201---------- Gilford	Seepage---------	Seepage, wetness.	Floods, frost action.	Wetness, soil blowing.	Not needed-----	Wetness.
223B---------- Varna	Favorable------	Favorable------	Not needed-----	Percs slowly---	Percs slowly---	Percs slowly.
223C3---------- Varna	Slope, seepage.	Favorable------	Not needed-----	Slope, percs slowly.	Percs slowly---	Percs slowly.
228A---------- Nappanee	Favorable------	Hard to pack, wetness.	Percs slowly---	Percs slowly, wetness, erodes easily.	Not needed-----	Percs slowly, wetness, erodes easily.
228B---------- Nappanee	Favorable------	Hard to pack, wetness.	Percs slowly---	Percs slowly, wetness, erodes easily.	Wetness, percs slowly, erodes easily.	Percs slowly, wetness, erodes easily.
232---------- Ashkum	Favorable------	Wetness---------	Frost action, floods.	Wetness---------	Not needed-----	Wetness.
235---------- Bryce	Favorable------	Hard to pack, wetness.	Percs slowly, floods, frost action.	Wetness, slow intake, percs slowly.	Not needed-----	Wetness, percs slowly.
241G---------- Chatsworth	Slope----------	Hard to pack---	Not needed-----	Erodes easily, percs slowly, slope.	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
290B---------- Warsaw	Seepage---------	Seepage---------	Not needed-----	Soil blowing---	Too sandy, soil blowing.	Favorable.
293---------- Andres	Seepage---------	Wetness---------	Frost action---	Wetness---------	Not needed-----	Wetness, erodes easily.
294B---------- Symerton	Seepage---------	Favorable------	Not needed-----	Favorable------	Erodes easily	Erodes easily.
294C2---------- Symerton	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Erodes easily	Erodes easily.
315B---------- Channahon	Depth to rock	Thin layer-----	Not needed-----	Rooting depth, erodes easily.	Depth to rock	Erodes easily, rooting depth.
330---------- Peotone	Favorable------	Wetness, hard to pack.	Percs slowly, floods, frost action.	Wetness, percs slowly, floods.	Not needed-----	Wetness.
343---------- Kane	Seepage---------	Seepage---------	Frost action---	Wetness---------	Not needed-----	Wetness.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
354B---------- Hononegah	Seepage--------	Seepage--------	Not needed-----	Droughty, fast intake, soil blowing.	Soil blowing, too sandy.	Droughty.
354C---------- Hononegah	Slope, seepage.	Seepage--------	Not needed-----	Droughty, fast intake, soil blowing.	Soil blowing, too sandy.	Slope, droughty.
392*. Urban land						
439A---------- Jasper	Seepage--------	Favorable------	Not needed-----	Favorable------	Not needed-----	Favorable.
439B---------- Jasper	Seepage--------	Favorable------	Not needed-----	Favorable------	Too sandy------	Favorable.
451---------- Lawson	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
503B---------- Rockton	Depth to rock, seepage.	Thin layer-----	Not needed-----	Rooting depth	Depth to rock	Depth to rock.
516---------- Faxon	Depth to rock	Thin layer, wetness.	Depth to rock, frost action, floods.	Wetness, rooting depth, floods.	Not needed-----	Wetness, depth to rock.
536*. Dumps						
553*: Bryce----------	Favorable------	Hard to pack, wetness.	Percs slowly, floods, frost action.	Wetness, floods, percs slowly.	Not needed-----	Wetness, percs slowly.
Calamine variant-	Depth to rock	Wetness, hard to pack, thin layer.	Floods, frost action.	Wetness, slow intake, percs slowly.	Not needed-----	Wetness, percs slowly, depth to rock.
555---------- Shadeland	Depth to rock	Thin layer, wetness.	Depth to rock, frost action.	Wetness, rooting depth, erodes easily.	Not needed-----	Wetness, erodes easily, depth to rock.
556B---------- High Gap	Depth to rock, seepage.	Thin layer-----	Not needed-----	Erodes easily, rooting depth.	Depth to rock	Erodes easily, depth to rock.
570B---------- Martinsville	Seepage--------	Favorable------	Not needed-----	Favorable------	Favorable------	Erodes easily.
570C---------- Martinsville	Slope, seepage.	Favorable------	Not needed-----	Slope----------	Favorable------	Erodes easily.
594---------- Reddick	Favorable------	Wetness, hard to pack.	Percs slowly, frost action.	Wetness, percs slowly.	Not needed-----	Wetness.
740---------- Darroch	Seepage--------	Wetness--------	Frost action---	Wetness--------	Not needed-----	Wetness.
776---------- Comfrey	Seepage--------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.
802D*, 802G*. Orthents						
811*. Aquolls						
863*, 865*. Pits						

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1107---------- Sawmill	Favorable------	Wetness--------	Floods, frost action.	Wetness, floods.	Not needed-----	Wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--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
23B---------- Blount	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
42---------- Papineau	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
49---------- Watseka	Severe: wetness.	Moderate: wetness, too sandy.	Severe: wetness.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.
69---------- Milford	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
73---------- Ross	Severe: floods.	Slight----------	Moderate: floods.	Slight----------	Moderate: floods.
88B---------- Sparta	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: too sandy.
89---------- Maumee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
91A, 91B---------- Swygert	Severe: wetness.	Moderate: too clayey, wetness.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: too clayey, wetness.
98B---------- Ade	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Moderate: too sandy.
107---------- Sawmill	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
125---------- Selma	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
132---------- Starks	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
145B---------- Saybrook	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
145C2---------- Saybrook	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
146A, 146B---------- Elliott	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
148A---------- Proctor	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
148B---------- Proctor	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
149---------- Brenton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
151---------- Ridgeville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
152--Drummer	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
184--Roby	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
189A--Martinton	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
194B--Morley	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight	Slight.
194C3--Morley	Moderate: percs slowly.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.	Moderate: too clayey.
201--Gilford	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
223B--Varna	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight	Slight.
223C3--Varna	Moderate: percs slowly.	Slight	Severe: slope.	Slight	Slight.
228A, 228B--Nappanee	Severe: percs slowly, wetness.	Moderate: wetness.	Severe: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.
232--Ashkum	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
235--Bryce	Severe: floods, wetness, too clayey.	Severe: wetness, too clayey.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: too clayey, wetness.
241G--Chatsworth	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.
290B--Warsaw	Slight	Slight	Moderate: slope.	Slight	Slight.
293--Andres	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
294B--Symerton	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight	Slight.
294C2--Symerton	Moderate: percs slowly.	Slight	Severe: slope.	Slight	Slight.
315B--Channahon	Slight	Slight	Severe: depth to rock.	Slight	Severe: thin layer.
330--Peotone	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
343--Kane	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
354B---------- Hononegah	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: too sandy.
354C---------- Hononegah	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope.	Moderate: too sandy.	Moderate: too sandy, slope.
392*. Urban land					
439A---------- Jasper	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
439B---------- Jasper	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
451---------- Lawson	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, floods.
503B---------- Rockton	Slight----------	Slight----------	Moderate: depth to rock, slope.	Slight----------	Moderate: thin layer.
516---------- Faxon	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.
536*. Dumps					
553*: Bryce----------	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Calamine variant-----	Severe: floods, wetness, too clayey.	Severe: wetness, too clayey.	Severe: too clayey, wetness.	Severe: wetness, too clayey.	Severe: too clayey, wetness.
555---------- Shadeland	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: small stones, wetness.
556B---------- High Gap	Slight----------	Slight----------	Moderate: slope, depth to rock.	Slight----------	Moderate: thin layer.
570B---------- Martinsville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
570C---------- Martinsville	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
594---------- Reddick	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
740---------- Darroch	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
776---------- Comfrey	Severe: wetness, floods.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
802D*, 802G*. Orthents					
811*. Aquolls					
863*, 865*. Pits					
1107---------- Sawmill	Severe: floods, wetness.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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
23B---------- Blount	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
42---------- Papineau	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
49---------- Watseka	Fair	Fair	Good	Good	Fair	Poor	Fair	Good	Poor.
69---------- Milford	Good	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
73---------- Ross	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
88B---------- Sparta	Fair	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
89---------- Maumee	Fair	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
91A---------- Swygert	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
91B---------- Swygert	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
98B---------- Ade	Poor	Fair	Fair	Poor	Very poor	Very poor	Fair	Poor	Very poor.
107---------- Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Poor.
125---------- Selma	Good	Good	Good	Good	Good	Good	Good	Good	Good.
132---------- Starks	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
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.
146A---------- Elliott	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
146B---------- Elliott	Fair	Good	Good	Good	Poor	Poor	Good	Good	Poor.
148A, 148B--------- Proctor	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
149---------- Brenton	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
151---------- Ridgeville	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
152---------- Drummer	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.

TABLE 13.--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
184---------- Roby	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
189A---------- Martinton	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
194B---------- Morley	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
194C3---------- Morley	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
201---------- Gilford	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
223B---------- Varna	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
223C3---------- Varna	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
228A---------- Nappanee	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
228B---------- Nappanee	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
232---------- Ashkum	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
235---------- Bryce	Good	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
241G---------- Chatsworth	Very poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
290B---------- Warsaw	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
293---------- Andres	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
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.
315B---------- Channahon	Poor	Poor	Fair	Fair	Poor	Very poor	Poor	Fair	Very poor.
330---------- Peotone	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	---
343---------- Kane	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
354B---------- Hononegah	Poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
354C---------- Hononegah	Very poor	Poor	Fair	Fair	Very poor	Very poor	Poor	Fair	Very poor.
392*. Urban land									

See footnote at end of table.

TABLE 13.--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
439A, 439B--------- Jasper	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
451---------- Lawson	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
503B---------- Rockton	Fair	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
516---------- Faxon	Fair	Fair	Fair	Poor	Good	Fair	Fair	Poor	Fair.
536*. Dumps									
553*: Bryce----------	Good	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Calamine variant--	Good	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
555---------- Shadeland	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
556B---------- High Gap	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
570B---------- Martinsville	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor.
570C---------- Martinsville	Fair	Good	Good	Good	Very poor	Very poor	Good	Good	Very poor.
594---------- Reddick	Good	Good	Good	Good	Good	Good	Good	Good	Poor.
740---------- Darroch	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
776---------- Comfrey	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
802D*, 802G*. Orthents									
811*. Aquolls									
863*, 865*. Pits									
1107---------- Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Poor.

* 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		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
23B---------- Blount	0-8	Silt loam-------	ML, CL	A-6, A-4	0-5	95-100	95-100	90-100	80-95	25-40	3-15
	8-19	Silty clay loam, silty clay, clay loam.	CH, CL	A-7, A-6	0-5	95-100	90-100	90-100	80-95	35-60	15-35
	19-60	Silty clay loam, clay loam.	CL	A-6	0-10	90-100	90-100	80-100	70-90	25-40	10-25
42---------- Papineau	0-10	Sandy loam------	SM-SC, SC	A-4, A-2-4	0	100	95-100	65-85	30-50	<25	5-10
	10-32	Sandy loam, sandy clay loam, clay loam.	SC, CL	A-4, A-6	0	100	100	70-95	36-85	20-40	8-25
	32-60	Clay, silty clay	CH	A-7	0	100	100	95-100	75-100	50-65	30-45
49---------- Watseka	0-16	Loamy fine sand	SM, SM-SC	A-2	0	100	95-100	80-100	17-35	<25	NP-5
	16-60	Fine sand, sand, loamy fine sand.	SP, SM, SP-SM	A-3, A-2	0	90-100	90-100	60-80	3-25	<20	NP-4
69---------- Milford	0-16	Silty clay loam	CL, CH	A-7	0	100	95-100	90-100	80-95	40-60	20-35
	16-60	Silty clay, silty clay loam, clay loam.	CH, CL	A-7	0	100	95-100	90-100	75-100	40-60	20-40
73---------- Ross	0-25	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0	90-100	90-100	80-100	65-95	20-35	NP-12
	25-53	Loam, silt loam	ML, CL	A-6, A-4, A-7	0	90-100	85-100	70-100	55-95	30-45	3-18
	53-60	Stratified gravel to silty clay loam.	CL, ML, SM, GM	A-6, A-1, A-2	0-5	50-100	40-100	30-100	10-80	<30	NP-12
88B---------- Sparta	0-20	Loamy fine sand	SM, ML	A-2, A-4	0	100	100	60-95	20-55	---	NP
	20-60	Sand, fine sand	SP-SM, SM	A-2, A-3	0	100	100	60-95	5-30	---	NP
89---------- Maumee	0-15	Loamy fine sand	SM	A-2-4	0	95-100	90-100	65-85	20-30	<30	NP-5
	15-60	Sand, loamy fine sand.	SP, SP-SM	A-1-B, A-3, A-2-4	0	85-100	75-95	18-60	3-10	<30	NP
91A, 91B---------- Swygert	0-13	Silty clay loam	CL	A-7	0	100	100	95-100	85-95	40-50	15-25
	13-44	Silty clay, clay, silty clay loam.	CH, CL	A-7, A-6	0	95-100	95-100	95-100	85-95	35-55	20-30
	44-60	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	95-100	95-100	90-100	80-95	35-55	20-30
98B---------- Ade	0-22	Loamy fine sand	SM, SP-SM	A-2-4	0	100	100	65-80	10-35	---	NP
	22-29	Fine sand, loamy fine sand.	SP, SM, SP-SM	A-3, A-2-4	0	100	100	65-80	3-15	---	NP
	29-60	Stratified sand to loam.	SP, SM, SP-SM	A-3, A-2-4	0	100	100	65-80	3-15	---	NP
107---------- Sawmill	0-25	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	80-100	30-50	15-30
	25-63	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	70-100	25-45	10-30
125---------- Selma	0-16	Loam------------	SC, CL	A-4, A-6	0	100	98-100	90-100	35-70	25-35	7-17
	16-45	Loam, clay loam, sandy clay 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

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	
132---------- Starks	0-11	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	22-35	5-15
	11-27	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-100	35-45	15-24
	27-34	Sandy clay loam, loam, clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6	0	95-100	90-100	80-95	40-80	20-40	6-17
	34-60	Stratified coarse sand to silty clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	80-95	40-90	30-60	<30	NP-15
145B---------- Saybrook	0-14	Silt loam-------	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-40	5-20
	14-32	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-100	35-50	15-30
	32-60	Clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	85-100	80-95	60-85	20-40	8-25
145C2---------- Saybrook	0-6	Silt loam-------	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-40	5-20
	6-32	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	85-100	35-50	15-30
	32-60	Clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	85-100	80-95	60-85	20-40	8-25
146A, 146B---------- Elliott	0-15	Silt loam-------	CL, ML	A-6, A-7	0	95-100	95-100	95-100	80-99	30-50	10-20
	15-38	Silty clay, silty clay loam.	CL	A-6, A-7	0-5	95-100	95-100	90-100	75-99	30-50	11-26
	38-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-5	95-100	95-100	90-100	70-95	28-45	11-24
148A, 148B---------- Proctor	0-15	Silt loam-------	CL	A-6	0	100	100	95-100	85-100	25-40	10-22
	15-45	Silty clay loam, silt loam, clay loam.	CL	A-7, A-6	0	95-100	90-100	85-100	65-90	25-50	10-25
	45-60	Stratified loam to sand.	SC, CL, SM-SC, CL-ML	A-2, A-4, A-6	0	85-100	80-100	50-100	25-80	20-40	5-20
149---------- Brenton	0-14	Silt loam-------	CL, ML	A-6, A-4	0	100	95-100	95-100	80-100	30-40	5-15
	14-36	Silty clay loam	CL, ML	A-6, A-7	0	100	95-100	95-100	75-95	35-50	10-25
	36-60	Stratified silt loam to gravelly sand.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-2	0	90-100	75-100	70-100	30-85	20-35	5-20
151---------- Ridgeville	0-20	Fine sandy loam	SC, SM, SM-SC	A-2, A-4, A-6	0	100	100	90-100	18-50	10-29	NP-12
	20-41	Fine sandy loam, sandy loam, loam.	SM-SC, SC, CL, CL-ML	A-4, A-6	0	95-100	95-100	75-95	36-60	20-34	5-14
	41-60	Loamy sand, sandy loam, sand.	SM, SM-SC, SC, SP-SM	A-2, A-4	0	90-100	90-100	70-98	12-50	<20	NP-8
152---------- Drummer	0-14	Silty clay loam	CL	A-6, A-7	0	100	95-100	85-100	72-95	30-50	15-30
	14-45	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	95-100	85-100	70-90	30-50	15-30
	45-60	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

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	
184----------	0-6	Fine sandy loam	SM, SM-SC	A-4	0	95-100	95-100	85-95	35-50	<25	NP-7
Roby	6-15	Loamy fine sand, fine sand, fine sandy loam.	SM, SM-SC	A-4, A-2	0	90-100	90-100	65-90	20-50	<20	NP-7
	15-32	Fine sandy loam, sandy loam, loam.	SM, ML	A-4, A-2	0	90-100	90-100	85-95	30-75	20-34	NP-7
	32-60	Stratified gravelly sand to loam.	SM, SM-SC, SP-SM, ML	A-4, A-2	0	80-100	75-90	50-90	10-65	<20	NP-7
189A----------	0-12	Silt loam-------	ML	A-6, A-7	0	95-100	95-100	90-100	75-95	34-49	10-19
Martinton	12-37	Silty clay loam, silty clay.	CH, CL	A-7	0	95-100	95-100	90-100	70-95	40-60	16-32
	37-60	Stratified sandy loam to silty clay loam.	CL, ML, SM, SC	A-4, A-6, A-7	0	95-100	95-100	90-100	35-90	25-50	NP-25
194B----------	0-11	Silt loam-------	CL, CL-ML	A-6, A-4	0-5	95-100	95-100	90-100	85-95	25-40	5-15
Morley	11-21	Silty clay, silty clay loam, clay.	CL, CH	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-55	15-30
	21-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-45	10-25
194C3----------	0-7	Silty clay loam	CL	A-6	0-5	95-100	90-100	85-95	80-90	25-40	10-20
Morley	7-14	Silty clay, silty clay loam, clay.	CL, CH	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-55	15-30
	14-60	Silty clay loam, clay loam.	CL	A-6, A-7	0-10	95-100	90-100	85-95	80-90	30-45	10-25
201----------	0-22	Fine sandy loam	SM, SC, SM-SC	A-4	0	95-100	90-100	65-80	35-45	<25	2-10
Gilford	22-41	Sandy loam, fine sandy loam.	SM, SC, SM-SC	A-2-4	0	90-100	90-100	55-70	20-35	15-30	NP-8
	41-60	Loamy sand, sand	SM, SP, SP-SM	A-3, A-1-B, A-2-4	0	90-100	85-100	18-60	3-20	---	NP
223B----------	0-13	Silt loam-------	CL	A-6, A-4	0-5	95-100	95-100	95-100	85-95	25-40	8-20
Varna	13-29	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
	29-60	Silty clay loam, clay loam.	CL	A-7, A-6	0-10	95-100	95-100	90-98	80-95	30-45	13-26
223C3----------	0-7	Silty clay loam	CL	A-6	0-5	95-100	95-100	95-100	85-95	25-40	10-20
Varna	7-19	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
	19-60	Silty clay loam, clay loam.	CL	A-7, A-6	0-10	95-100	95-100	90-98	80-95	30-45	13-26
228A, 228B----------	0-7	Silt loam-------	ML, CL	A-4, A-6	0-5	95-100	95-100	85-100	55-90	25-40	3-15
Nappanee	7-30	Silty clay, silty clay loam, clay.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	70-95	25-70	10-42
	30-60	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0-5	95-100	95-100	85-100	70-95	25-60	10-34
232----------	0-33	Silty clay loam	CL, CH	A-7	0	100	98-100	95-100	75-100	45-65	20-35
Ashkum	33-65	Silty clay loam	CL	A-7, A-6	0-5	98-100	95-100	90-100	75-95	35-50	15-30
235----------	0-18	Silty clay------	CH, CL	A-7	0	100	100	95-100	80-100	45-60	20-31
Bryce	18-41	Silty clay, clay	CH, CL	A-7	0-5	100	100	95-100	85-100	47-62	25-40
	41-60	Silty clay, silty clay loam, clay.	CH, CL	A-7, A-6	0-5	100	95-100	95-100	70-95	35-60	21-38

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	
241G----------	0-5	Silt loam-------	CL	A-7, A-6	0	100	100	95-100	90-100	25-50	10-30
Chatsworth	5-60	Silty clay, clay, silty clay loam.	CH, CL	A-7, A-6	0	100	95-100	90-100	85-100	35-65	15-45
290B----------	0-20	Sandy loam------	SC, SM-SC	A-2-4, A-4	0	80-100	75-100	50-70	25-40	20-30	4-10
Warsaw	20-36	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
	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
293----------	0-16	Silt loam-------	CL, OL	A-7, A-6	0	95-100	95-100	90-99	80-94	35-50	13-21
Andres	16-32	Silty clay loam, clay loam, sandy clay loam.	CL	A-7	0-5	95-100	95-100	95-100	80-99	40-50	16-26
	32-66	Silty clay loam	CL	A-6, A-7	0-5	95-100	95-100	85-100	70-95	28-48	11-26
294B, 294C2--------	0-13	Silt loam-------	CL, ML	A-7, A-6	0	95-100	95-100	90-100	60-95	35-50	11-20
Symerton	13-29	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
	29-60	Silty clay loam	CL	A-7, A-6	0-10	95-100	95-100	85-100	75-85	30-45	13-26
315B----------	0-12	Loam------------	CL	A-6, A-4	0-20	95-100	95-100	85-100	65-90	21-38	7-18
Channahon	12-18	Loam, sandy clay loam, clay loam.	CL	A-6, A-7	0-20	95-100	90-100	85-100	50-85	30-46	15-25
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
330----------	0-19	Silty clay loam	CH, CL	A-7	0	100	95-100	95-100	80-100	40-65	15-35
Peotone	19-69	Silty clay loam, silty clay.	CH, CL	A-7	0-5	100	95-100	90-100	85-100	41-70	17-39
343----------	0-11	Silt loam-------	CL, CL-ML	A-6, A-4	0	95-100	95-100	90-100	75-95	25-35	5-15
Kane	11-26	Silty clay loam, clay loam.	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-45	10-20
	26-34	Clay loam, sandy loam.	SC, CL	A-6, A-4	0-5	90-95	85-95	70-90	40-70	20-35	8-15
	34-60	Gravelly loamy sand, sand, gravel.	SP, GP, SP-SM, GP-GM	A-1	0-10	30-70	30-55	10-30	2-12	<5	NP
354B, 354C----------	0-24	Loamy sand------	SM, SM-SC	A-2, A-4	0-10	90-100	85-100	60-80	20-45	15-25	NP-6
Hononegah	24-28	Coarse sand, loamy sand, sandy loam.	SM, SP-SM, SM-SC	A-2, A-1	0-15	80-95	75-95	40-60	10-30	10-20	NP-6
	28-60	Sand, gravel, loamy coarse sand.	SP, GP, GM, SM	A-1	0-15	30-65	20-60	10-35	0-20	---	NP
392*.											
Urban land											
Orthents											

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	
439A, 439B--------- Jasper	0-18	Silt loam-------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	18-46	Loam, clay loam, silty clay loam.	CL-ML, CL, SM-SC, SC	A-6, A-4	0	100	100	60-100	35-85	20-35	5-20
	46-60	Loamy sand, sand	SM, SP-SM, SC, SM-SC	A-2-4, A-3	0	100	100	50-75	5-30	<25	NP-10
451---------- Lawson	0-33	Silt loam-------	CL, CL-ML	A-4	0	100	100	90-100	80-100	20-30	5-10
	33-60	Silt loam, silty clay loam, loam.	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-100	20-40	5-20
503B--------- Rockton	0-20	Silt loam, loam.	ML, CL-ML, CL	A-4	0	90-100	90-100	85-95	50-75	25-35	5-10
	20-27	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
	27	Weathered bedrock.	---	---	---	---	---	---	---	---	---
516---------- Faxon	0-19	Silty clay loam	CL	A-7	0-10	95-100	85-100	85-100	80-95	40-50	15-25
	19-34	Loam, sandy loam, clay loam.	CL, ML, SC, SM	A-7, A-6	0-10	95-100	70-100	65-95	40-85	30-50	10-20
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
536*. Dumps											
553*: Bryce----------	0-9	Silty clay loam	CL	A-7	0	100	100	95-100	85-95	41-50	20-30
	9-56	Silty clay------	CH, CL	A-7	0	100	100	95-100	90-95	45-60	25-35
	56	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Calamine variant--	0-13	Silty clay------	CH, CL	A-7	0-5	100	100	95-100	90-95	45-60	25-35
	13-35	Silty clay------	CH	A-7	0-5	100	100	95-100	90-95	50-65	25-40
	35	Weathered bedrock.	---	---	---	---	---	---	---	---	---
555---------- Shadeland	0-13	Loam----------	CL, CL-ML	A-4, A-6	0-5	90-100	70-100	60-100	50-90	25-35	5-15
	13-37	Clay loam, silty clay, sandy clay loam.	CL	A-6, A-7	0-5	90-100	70-100	60-100	50-80	35-45	15-25
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
556B--------- High Gap	0-9	Loam----------	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	9-36	Clay loam, silty clay loam, loam.	CL	A-6, A-7	0	100	95-100	90-100	70-80	30-45	15-25
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
570B, 570C--------- Martinsville	0-8	Loam----------	CL, CL-ML	A-4, A-6	0	100	90-100	80-100	60-90	22-33	4-12
	8-60	Clay loam, silty clay loam, loam.	CL, SC	A-4, A-6	0	100	90-100	65-90	40-90	20-35	8-20

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	
594----------	0-10	Silty clay loam	CL	A-6, A-7	0	95-100	85-95	85-95	75-90	30-50	10-25
Reddick	10-40	Clay loam, silty clay loam, sandy loam.	CL	A-6, A-7	0-5	95-100	80-90	80-90	65-90	30-50	10-25
	40-68	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-10	95-100	90-100	85-95	80-95	35-55	15-30
740----------	0-10	Silt loam-------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
Darroch	10-39	Clay loam, loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-80	35-50	15-25
	39-65	Stratified sand to silt.	SC, CL-ML, CL, SM-SC	A-4	0	100	100	75-90	35-85	<30	5-10
776----------	0-29	Loam----------	OL, OH, MH, ML	A-7	0	100	100	85-98	65-85	45-60	12-20
Comfrey	29-65	Clay loam, sandy clay loam.	CL	A-7, A-6	0	100	100	80-98	60-85	35-50	12-25
802D*, 802G*. Orthents											
811*. Aquolls											
863*, 865*. Pits											
1107----------	0-25	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	80-100	30-50	15-30
Sawmill	25-63	Stratified silty clay loam to loam.	CL	A-6, A-7	0	100	100	95-100	70-100	25-45	10-30

* 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
23B----------	0-8	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.43	3	2-3
Blount	8-19	0.06-0.6	0.06-0.10	4.5-6.5	Moderate-------	0.43		
	19-60	0.06-0.6	0.07-0.10	7.4-8.4	Moderate-------	0.43		
42----------	0-10	2.0-6.0	0.14-0.17	5.6-7.3	Low----------	0.20	4	2-4
Papineau	10-32	0.6-2.0	0.13-0.17	5.6-7.3	Moderate-------	0.28		
	32-60	0.06-0.2	0.08-0.12	6.6-8.4	Moderate-------	0.28		
49----------	0-16	6.0-20	0.10-0.12	6.1-7.3	Low----------	0.17	5	2-3
Watseka	16-60	6.0-20	0.05-0.10	5.1-7.3	Low----------	0.17		
69----------	0-16	0.6-2.0	0.12-0.23	6.1-7.3	High----------	0.28	5	5-6
Milford	16-60	0.2-0.6	0.11-0.20	6.6-7.8	High----------	0.28		
73----------	0-25	0.6-2.0	0.19-0.24	6.1-7.8	Low----------	0.24	5	2-3
Ross	25-53	0.6-2.0	0.16-0.22	6.1-7.8	Low----------	0.24		
	53-60	0.6-6.0	0.05-0.18	6.1-7.8	Low----------	0.24		
88B----------	0-20	2.0-6.0	0.10-0.12	5.1-7.3	Low----------	0.17	5	1-2
Sparta	20-60	6.0-20	0.05-0.07	5.1-6.0	Low----------	0.17		
89----------	0-15	6.0-20	0.10-0.12	6.1-7.3	Low----------	0.17	5	4-5
Maumee	15-60	6.0-20	0.05-0.07	6.1-8.4	Low----------	0.17		
91A, 91B---------	0-13	0.2-0.6	0.21-0.23	5.6-7.3	Moderate-------	0.43	3	3-4
Swygert	13-44	0.06-0.2	0.10-0.19	6.1-8.4	High----------	0.32		
	44-60	0.06-0.2	0.10-0.18	7.9-8.4	Moderate-------	0.32		
98B----------	0-22	6.0-20	0.10-0.12	5.1-6.5	Low----------	0.17	5	1-2
Ade	22-29	6.0-20	0.06-0.08	5.1-6.0	Low----------	0.17		
	29-60	6.0-20	0.06-0.08	5.1-6.5	Low----------	0.17		
107----------	0-25	0.2-2.0	0.18-0.23	6.1-7.8	Moderate-------	0.28	5	4-5
Sawmill	25-63	0.2-2.0	0.11-0.20	7.4-8.4	Moderate-------	0.28		
125----------	0-16	0.6-2.0	0.17-0.22	6.1-7.8	Moderate-------	0.28	5	4-6
Selma	16-45	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	6.1-8.4	Low----------	0.28		
132----------	0-11	0.6-2.0	0.22-0.24	5.6-7.3	Moderate-------	0.37	5	1-3
Starks	11-27	0.2-0.6	0.18-0.20	5.1-6.5	Moderate-------	0.37		
	27-34	0.2-0.6	0.16-0.19	5.1-7.3	Moderate-------	0.37		
	34-60	2.0-6.0	0.08-0.18	5.6-8.4	Very low-------	0.37		
145B----------	0-14	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.28	5	3-4
Saybrook	14-32	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
	32-60	0.6-2.0	0.15-0.21	6.1-8.4	Low----------	0.43		
145C2---------	0-6	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.28	5	3-4
Saybrook	6-32	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-------	0.43		
	32-60	0.6-2.0	0.15-0.21	6.1-8.4	Low----------	0.43		
146A, 146B-------	0-15	0.6-2.0	0.21-0.24	5.6-7.3	Moderate-------	0.28	4	4-5
Elliott	15-38	0.2-0.6	0.11-0.20	5.6-7.8	Moderate-------	0.28		
	38-60	0.2-0.6	0.14-0.20	7.4-8.4	Moderate-------	0.28		
148A, 148B-------	0-15	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.32	5-4	3-4
Proctor	15-45	0.6-2.0	0.15-0.20	5.6-6.5	Moderate-------	0.43		
	45-60	0.6-6.0	0.07-0.19	6.1-8.4	Low----------	0.43		
149----------	0-14	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.32	5	4-5
Brenton	14-36	0.6-2.0	0.18-0.20	5.6-6.5	Moderate-------	0.43		
	36-60	0.6-20.0	0.05-0.20	6.1-8.4	Low----------	0.43		

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
151----------	0-20	0.6-6.0	0.15-0.22	5.6-6.5	Low----------	0.20	4	2-3
Ridgeville	20-41	0.6-6.0	0.15-0.19	5.6-6.5	Low----------	0.20		
	41-60	6.0-20	0.05-0.13	6.6-7.8	Low----------	0.20		
152----------	0-14	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-------	0.28	5	5-7
Drummer	14-45	0.6-2.0	0.21-0.24	5.6-7.3	Moderate-------	0.28		
	45-60	0.6-2.0	0.11-0.19	6.6-8.4	Low----------	0.28		
184----------	0-6	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.20	4	1-2
Roby	6-15	0.6-2.0	0.09-0.20	4.5-6.0	Low----------	0.28		
	15-32	0.6-2.0	0.12-0.19	5.6-7.8	Low----------	0.28		
	32-60	2.0-6.0	0.04-0.17	5.6-7.8	Low----------	0.10		
189A----------	0-12	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.32	4	4-5
Martinton	12-37	0.2-0.6	0.11-0.20	5.6-7.8	Moderate-------	0.43		
	37-60	0.06-0.2	0.11-0.22	7.4-8.4	Moderate-------	0.43		
194B----------	0-11	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.43	3	2-3
Morley	11-21	0.06-0.2	0.11-0.13	5.6-6.5	Moderate-------	0.43		
	21-60	0.2-0.6	0.09-0.20	6.6-8.4	Moderate-------	0.43		
194C3----------	0-7	0.2-0.6	0.18-0.22	5.1-6.5	Moderate-------	0.43	2	.5-1
Morley	7-14	0.06-0.2	0.11-0.13	5.6-6.5	Moderate-------	0.43		
	14-60	0.2-0.6	0.09-0.20	6.6-8.4	Moderate-------	0.43		
201----------	0-22	2.0-6.0	0.16-0.18	6.1-7.8	Low----------	0.20	5	4-5
Gilford	22-41	2.0-6.0	0.12-0.14	6.1-7.3	Low----------	0.20		
	41-60	6.0-20	0.05-0.08	6.6-8.4	Low----------	0.15		
223B----------	0-13	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.32	4-3	3-4
Varna	13-29	0.2-0.6	0.09-0.19	5.6-7.3	Moderate-------	0.32		
	29-60	0.2-0.6	0.14-0.20	6.6-8.4	Low----------	0.32		
223C3----------	0-7	0.2-0.6	0.21-0.23	5.6-7.3	Moderate-------	0.32	4-3	2-3
Varna	7-19	0.2-0.6	0.09-0.19	5.6-7.3	Moderate-------	0.32		
	19-60	0.2-0.6	0.14-0.20	6.6-8.4	Low----------	0.32		
228A, 228B-------	0-7	0.6-2.0	0.20-0.24	5.1-7.3	Low----------	0.43	3	1-2
Nappanee	7-30	<0.06	0.10-0.14	5.1-7.8	High----------	0.32		
	30-60	<0.06	0.08-0.12	7.4-8.4	High----------	0.32		
232----------	0-33	0.2-0.6	0.12-0.23	5.6-7.8	Moderate-------	0.28	5	5-7
Ashkum	33-65	0.2-0.6	0.18-0.20	6.1-8.4	Moderate-------	0.28		
235----------	0-18	0.2-0.6	0.12-0.23	5.6-7.8	Moderate-------	0.28	3	4-5
Bryce	18-41	0.06-0.2	0.09-0.13	6.1-8.4	Moderate-------	0.28		
	41-60	0.06-0.2	0.08-0.19	7.4-8.4	Moderate-------	0.28		
241G----------	0-5	0.2-2.0	0.21-0.24	5.6-7.8	Low----------	0.43	3	1-2
Chatsworth	5-60	<0.06	0.08-0.10	6.6-8.4	Moderate-------	0.32		
290B----------	0-20	0.6-2.0	0.13-0.15	5.6-7.3	Low----------	0.20	4	2-3
Warsaw	20-36	0.6-2.0	0.16-0.19	5.1-7.8	Low----------	0.28		
	36-60	>20	0.02-0.04	7.9-8.4	Low----------	0.10		
293----------	0-16	0.6-2.0	0.21-0.24	5.6-7.3	Low----------	0.28	5	4-5
Andres	16-32	0.6-2.0	0.16-0.20	6.1-7.8	Moderate-------	0.28		
	32-66	0.2-0.6	0.18-0.20	7.9-8.4	Moderate-------	0.37		
294B, 294C2------	0-13	0.6-2.0	0.20-0.24	5.6-6.5	Low----------	0.32	4-3	3-4
Symerton	13-29	0.6-2.0	0.16-0.20	5.6-7.8	Moderate-------	0.32		
	29-60	0.2-0.6	0.18-0.20	6.6-8.4	Moderate-------	0.43		
315B----------	0-12	0.6-2.0	0.20-0.24	6.1-8.4	Low----------	0.37	2-1	2-3
Channahon	12-18	0.6-2.0	0.15-0.22	6.1-8.4	Moderate-------	0.37		
	18	---	---	---	----------	---		
330----------	0-19	0.2-0.6	0.12-0.23	5.6-7.3	High----------	0.28	5	5-6
Peotone	19-69	0.2-0.6	0.11-0.20	6.1-7.8	High----------	0.28		

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
343----------	0-11	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.28	4	3-4
Kane	11-26	0.6-2.0	0.15-0.20	5.6-7.3	Moderate-------	0.28		
	26-34	0.6-6.0	0.12-0.18	6.1-7.8	Low----------	0.28		
	34-60	6.0-20	0.02-0.04	7.9-8.4	Very low-------	0.10		
354B, 354C-------	0-24	>20	0.04-0.06	5.6-7.8	Low----------	0.17	4	1-2
Hononegah	24-28	>20	0.03-0.05	5.6-7.8	Low----------	0.17		
	28-60	>20	0.02-0.03	7.9-8.4	Low----------	0.10		
392*.								
Urban land								
439A, 439B-------	0-18	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.28	5	2-3
Jasper	18-46	0.6-2.0	0.13-0.19	5.1-6.5	Low----------	0.28		
	46-60	2.0-6.0	0.05-0.10	6.1-7.8	Low----------	0.20		
451----------	0-33	0.6-2.0	0.22-0.24	5.6-7.8	Low----------	0.28	5	4-5
Lawson	33-60	0.6-2.0	0.20-0.22	6.1-7.8	Low----------	0.28		
503B----------	0-20	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.28	4	2-4
Rockton	20-27	0.6-2.0	0.17-0.19	5.1-7.3	Moderate-------	0.28		
	27	---	---	---	----------	---		
516----------	0-19	0.6-2.0	0.17-0.22	6.6-7.8	Moderate-------	0.28	4	4-6
Faxon	19-34	0.6-2.0	0.12-0.19	6.6-7.8	Moderate-------	0.28		
	34	---	---	---	----------	---		
536*.								
Dumps								
553*:								
Bryce----------	0-9	0.2-0.6	0.21-0.23	5.6-7.3	Moderate-------	0.28	4	5-7
	9-56	0.06-0.2	0.11-0.13	6.6-7.8	Moderate-------	0.28		
	56	---	---	---	----------	---		
Calamine variant	0-13	0.2-0.6	0.12-0.14	6.1-7.8	Moderate-------	0.28	4	4-6
	13-35	0.06-0.2	0.11-0.13	6.6-8.4	Moderate-------	0.28		
	35	---	---	---	----------	---		
555----------	0-13	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.37	4	2-3
Shadeland	13-37	0.2-0.6	0.15-0.19	5.1-6.0	Moderate-------	0.37		
	37	---	---	---	----------	---		
556B----------	0-9	0.6-2.0	0.22-0.24	4.5-6.0	Low----------	0.37	4	2-3
High Gap	9-36	0.6-2.0	0.15-0.19	4.5-6.0	Low----------	0.37		
	36	---	---	---	----------	---		
570B, 570C-------	0-8	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	1-2
Martinsville	8-60	0.6-2.0	0.17-0.20	5.1-6.0	Moderate-------	0.37		
594----------	0-10	0.6-2.0	0.17-0.23	7.4-7.8	Moderate-------	0.28	5	5-6
Reddick	10-40	0.6-2.0	0.15-0.20	7.4-8.4	Moderate-------	0.28		
	40-68	<0.2	0.08-0.20	7.9-8.4	Moderate-------	0.28		
740----------	0-10	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.32	5	4-5
Darroch	10-39	0.2-0.6	0.15-0.19	4.5-7.8	Moderate-------	0.32		
	39-65	0.2-0.6	0.19-0.21	7.9-8.4	Low----------	0.32		
776----------	0-29	0.6-2.0	0.18-0.22	6.6-7.8	Moderate-------	0.28	5	6-10
Comfrey	29-71	0.6-2.0	0.15-0.19	6.6-8.4	Moderate-------	0.28		
802D*, 802G*.								
Orthents								
811*.								
Aquolls								
863*, 865*.								
Pits								

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
1107----------	0-25	0.2-2.0	0.21-0.23	6.1-7.8	Moderate-------	0.28	5	4-5
Sawmill	25-63	0.2-0.6	0.18-0.20	7.4-8.4	Moderate-------	0.28		

* 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 Glossary 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				
23B---------- Blount	C	None--------	---	---	1.0-3.0	Perched	Jan-May	>60	---	High-----	High-----	High.
42---------- Papineau	C	None--------	---	---	1.0-3.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Low.
49---------- Watseka	B	None--------	---	---	1.0-3.0	Apparent	Feb-May	>60	---	Moderate	Low------	High.
69---------- Milford	B/D	Occasional	Brief-----	Apr-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
73---------- Ross	B	Occasional	Very brief	Mar-Jun	>6.0	Apparent	Feb-Apr	>60	---	Moderate	Low------	Low.
88B---------- Sparta	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Moderate.
89---------- Maumee	A/D	None--------	---	---	0-2.0	Apparent	Dec-May	>60	---	Moderate	High-----	Moderate.
91A, 91B---------- Swygert	C	None--------	---	---	1.0-3.0	Apparent	Feb-May	>60	---	High-----	High-----	Low.
98B---------- Ade	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
107---------- Sawmill	B/D	Frequent----	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
125---------- Selma	B/D	Occasional	Brief-----	Apr-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
132---------- Starks	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
145B, 145C2------- Saybrook	B	None--------	---	---	4.0-6.0	---	---	>60	---	High-----	High-----	Moderate.
146A, 146B-------- Elliott	C	None--------	---	---	1.0-3.0	Perched	Mar-May	>60	---	High-----	High-----	Moderate.
148A, 148B-------- Proctor	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
149---------- Brenton	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
151---------- Ridgeville	B	None--------	---	---	1.0-3.0	Apparent	Feb-May	>60	---	High-----	Moderate	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
152---------- Drummer	B/D	Occasional	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
184---------- Roby	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	Moderate	High.
189A---------- Martinton	C	None--------	---	---	1.0-3.0	Apparent	Feb-May	>60	---	High-----	High-----	Moderate.
194B, 194C3------- Morley	C	None--------	---	---	3.0-6.0	Perched	Mar-May	>60	---	Moderate	High-----	Moderate.
201---------- Gilford	B/D	Occasional	Brief-----	Dec-May	0-1.0	Apparent	Dec-May	>60	---	High-----	High-----	Moderate.
223B, 223C3------- Varna	C	None--------	---	---	3.0-6.0	Perched	Mar-May	>60	---	High-----	Moderate	Moderate.
228A, 228B-------- Nappanee	D	None--------	---	---	1.0-3.0	Apparent	Nov-May	>60	---	Moderate	High-----	Low.
232---------- Ashkum	B/D	Occasional	Brief-----	Apr-May	0-2.0	Apparent	Apr-Jun	>60	---	High-----	High-----	Moderate.
235---------- Bryce	D	Occasional	Brief-----	Mar-Jun	0-1.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Low.
241G---------- Chatsworth	D	None--------	---	---	3.0-6.0	Perched	Nov-Apr	>60	---	Moderate	High-----	Low.
290B---------- Warsaw	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate
293---------- Andres	B	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
294B, 294C2------- Symerton	B	None--------	---	---	4.0-6.0	Apparent	Mar-May	>60	---	Moderate	Moderate	Moderate.
315B---------- Channahon	D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
330---------- Peotone	B/D	Occasional	Long------	Feb-Jul	0-1.0	Perched	Feb-Jul	>60	---	High-----	High-----	Moderate.
343---------- Kane	B	None--------	---	---	1.0-3.0	Apparent	Feb-Jun	>60	---	High-----	High-----	Moderate.
354B, 354C-------- Hononegah	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
392*. Urban land												

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				
439A, 439B-------- Jasper	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
451---------- Lawson	B	Occasional	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High-----	Moderate	Low.
503B---------- Rockton	B	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Low------	Low.
516---------- Faxon	B/D	Common------	Very brief	Apr-May	0-2.0	Apparent	Nov-May	20-40	Hard	High-----	High-----	Low.
536*. Dumps												
553*:												
Bryce----------	D	Occasional	Long------	Mar-Jun	0-1.0	Apparent	Feb-Jun	40-60	Rippable	High-----	High-----	Low.
Calamine variant-	D	Occasional	Long------	Mar-Jun	0-2.0	Apparent	Feb-Jun	30-40	Rippable	High-----	High-----	Moderate.
555---------- Shadeland	C	None--------	---	---	1.0-3.0	Perched	Jan-Apr	20-40	Rippable	High-----	High-----	Moderate.
556B---------- High Gap	C	None--------	---	---	>6.0	---	---	20-40	Rippable	Moderate	Moderate	High.
570B, 570C-------- Martinsville	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
594---------- Reddick	B/D	None--------	---	---	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
740---------- Darroch	C	None--------	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	High.
776---------- Comfrey	B/D	Occasional	Brief-----	Apr-Jul	0-2.0	Apparent	Apr-Jul	>60	---	High-----	High-----	Low.
802D*, 802G*. Orthents												
811*. Aquolls												
863*, 865*. Pits												
1107---------- Sawmill	B/D	Frequent----	Long------	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--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
Ade	Coarse-loamy, mixed, mesic Psammentic Argiudolls
Andres	Fine-loamy, mixed, mesic Aquic Argiudolls
Ashkum	Fine, mixed, mesic Typic Haplaquolls
Blount	Fine, illitic, mesic Aeric Ochraqualfs
Brenton	Fine-silty, mixed, mesic Aquic Argiudolls
Bryce	Fine, mixed, mesic Typic Haplaquolls
Calamine variant	Fine, mixed, mesic Typic Haplaquolls
Channahon	Loamy, mixed, mesic Lithic Argiudolls
Chatsworth	Fine, illitic, mesic Typic Eutrochrepts
Comfrey	Fine-loamy, mixed, mesic Cumulic Haplaquolls
Darroch	Fine-loamy, mixed, mesic Aquic Argiudolls
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Elliott	Fine, illitic, mesic Aquic Argiudolls
Faxon	Fine-loamy, mixed, mesic Typic Haplaquolls
Gilford	Coarse-loamy, mixed, mesic Typic Haplaquolls
*High Gap	Fine-loamy, mixed, mesic Typic Hapludalfs
Hononegah	Sandy, mixed, mesic Entic Hapludolls
Jasper	Fine-loamy, mixed, mesic Typic Argiudolls
Kane	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Argiudolls
Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Martinsville	Fine-loamy, mixed, mesic Typic Hapludalfs
Martinton	Fine, illitic, mesic Aquic Argiudolls
Maumee	Sandy, mixed, mesic Typic Haplaquolls
Milford	Fine, mixed, mesic Typic Haplaquolls
Morley	Fine, illitic, mesic Typic Hapludalfs
Nappanee	Fine, illitic, mesic Aeric Ochraqualfs
Papineau	Fine-loamy over clayey, mixed, mesic Aquic Argiudolls
Peotone	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Proctor	Fine-silty, mixed, mesic Typic Argiudolls
Reddick	Fine-loamy, mixed, mesic Typic Haplaquolls
Ridgeville	Coarse-loamy, mixed, mesic Aquic Argiudolls
Roby	Coarse-loamy, mixed, mesic Aquic Hapludalfs
*Rockton	Fine-loamy, mixed, mesic Typic Argiudolls
Ross	Fine-loamy, mixed, mesic Cumulic Hapludolls
Sawmill	Fine-silty, mixed, mesic Cumulic Haplaquolls
Saybrook	Fine-silty, mixed, mesic Typic Argiudolls
Selma	Fine-loamy, mixed, mesic Typic Haplaquolls
*Shadeland	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Sparta	Sandy, mixed, mesic Entic Hapludolls
Starks	Fine-silty, mixed, mesic Aeric Ochraqualfs
Swygert	Fine, illitic, mesic Aquic Argiudolls
Symerton	Fine-loamy, mixed, mesic Typic Argiudolls
Varna	Fine, illitic, mesic Typic Argiudolls
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Watseka	Sandy, mixed, mesic Aquic Hapludolls

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