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Agriculture

Natural
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In cooperation with
Illinois Agricultural
Experiment Station

Soil Survey of Moultrie County, Illinois



How To Use This Soil Survey

General Soil Map

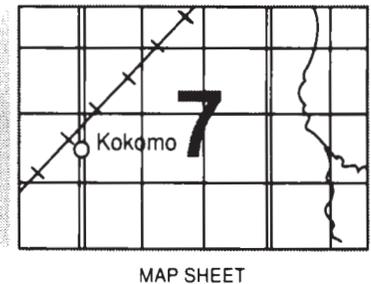
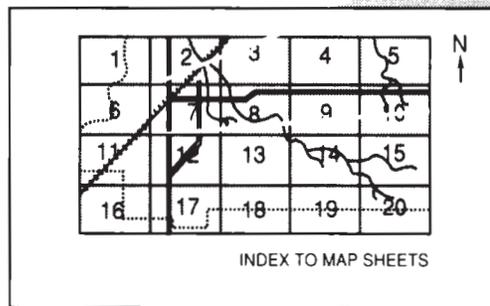
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

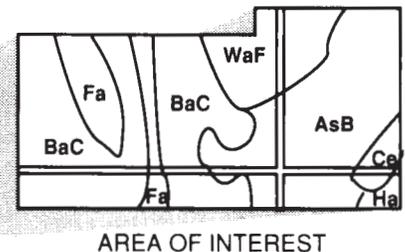
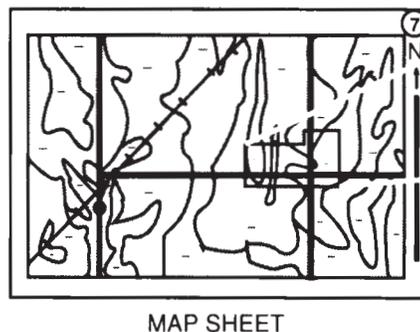
Detailed Soil Maps

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

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



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



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

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1993. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1992. This survey was made cooperatively by the Natural Resources Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Moultrie County Soil and Water Conservation District. The Illinois Department of Agriculture and the Moultrie County Board provided financial assistance.

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

This soil survey is Illinois Agricultural Experiment Station Soil Report 167.

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Cover: Corn harvest on an Amish farm in an area of the Drummer-Fianagan association.

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Foreword

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

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

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A 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 Natural Resources Conservation Service or the Cooperative Extension Service.

William J. Gradle
State Conservationist
Natural Resources Conservation Service

Soil Survey of Moultrie County, Illinois

By Randall A. Leeper and Kenneth A. Gotsch, Natural Resources Conservation Service

Fieldwork by Kenneth A. Gotsch, Randall A. Leeper, and David E. Preloger, Natural Resources Conservation Service, and Keith A. Whitaker, Moultrie County Board

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
the Illinois Agricultural Experiment Station

MOULTRIE COUNTY is in east-central Illinois (fig. 1). It has an area of 220,255 acres, or about 345 square miles. It is bordered on the north by Piatt County, on the east by Coles and Douglas Counties, on the south by Shelby County, and on the west by Macon and Shelby Counties. In 1990, the population of Moultrie County was 13,930. Sullivan, the county seat and largest town in the county, had a population of 4,350.

This soil survey updates the survey of Moultrie County published in 1911 (Hopkins and others, 1911). It provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the County

This section provides general information about Moultrie County. It describes settlement and development, physiography and drainage, natural resources, and climate.

Settlement and Development

Indians known as Mound Builders were among the first people to inhabit the survey area (Kehoe, 1981). The Kickapoo Indians inhabited the area just prior to the arrival of the first white settlers (Golden and Golden, 1990). By the time the settlers arrived, most of the Indians had moved westward across the Mississippi River.

The first permanent non-Indian settlement in Moultrie County was established in 1826 in the area that is now

Whitley Township. These early settlers used the rivers and creeks for fishing and for travel lanes. They also favored the timbered areas because of the availability of firewood, the abundance of game, the danger of prairie fires, and the belief that the prairies were in general infertile and unproductive. The prairie served mainly as open grazing land for their livestock. After the development of the moldboard plow and the organization of drainage districts in the late 1800's, grain farming became the major enterprise in the prairie areas.

Created from portions of Macon and Shelby Counties, Moultrie County officially became a separate county in 1843. The county was named for William Moultrie, a general who fought in the Revolutionary War and who later became a governor of South Carolina (Golden and Golden, 1990).

The first Amish immigrants arrived in the area in 1865 from Pennsylvania (Miller, 1980). The previous year, Bishop Joel Beachy of Maryland and Moses Yoder of Pennsylvania started west to find a location where they could raise a crop without liming the soil. After exploring locations in several states, they selected an area near the present town of Arthur. The Amish are primarily farmers (fig. 2), but their industry includes other fields, such as canning, butcher shops, and carpentry.

Agriculture is the leading industry in Moultrie County. Some light manufacturing is located in the town of Sullivan. Products include candy and small agricultural and automotive parts. These industries, along with

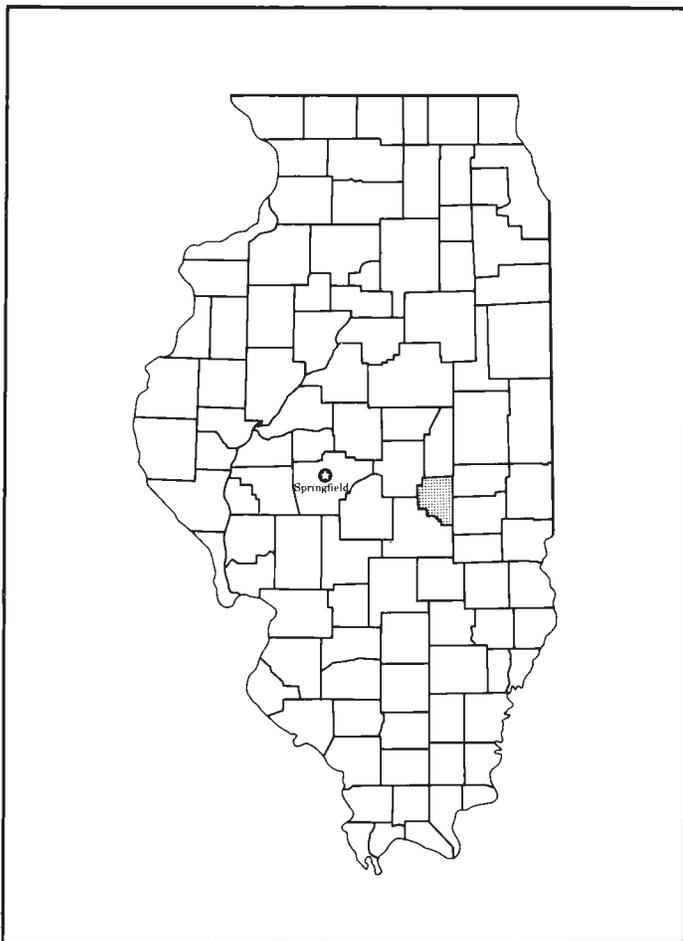


Figure 1.—Location of Moultrie County in Illinois.

small businesses providing goods and services, account for the employment of a high percentage of the labor force in the county. The cities of Decatur and Mattoon also provide sources of employment for Moultrie County.

The transportation systems are well developed in Moultrie County. They include Federal and State highways, county and township roads, railroads, and a small airport. State Routes 32, 121, 128, and 133 and U.S. Route 36 cross the county. Several county and township roads also provide important transportation links. Most of the secondary township and county roads are paved. Two railroad lines provide agricultural service to Sullivan and most of the smaller towns.

The creation of the Lake Shelbyville Reservoir has had a substantial impact on the development and growth of Moultrie County. This area, which is owned by the U.S. Army Corps of Engineers, consists of approximately 13,000 acres of land and about 5,500

acres of water. It offers attractive recreational areas and areas of wildlife habitat and provides for water management.

Physiography and Drainage

Moultrie County was repeatedly covered by glaciers during the Pleistocene. Most of the present surface materials and landforms are the result of the glacial ice, running water, and windblown deposits of the most recent glacial stage, the Wisconsin. The glaciers deposited 50 to more than 200 feet of glacial drift throughout the county (Willman and Frye, 1970). In most areas the drift was covered with as much as 5 feet of windblown silt, or loess. The Shelbyville Moraine (Johnson and others, 1971), an undulating ridge, is in the southeast corner of the county. It is a terminal moraine marking the farthest advance of the Wisconsin Glaciation in Illinois.

The relief in Moultrie County is low on the nearly level and gently sloping, broad uplands. It is greater in areas dissected by drainageways. The greatest change in relief is in areas along major drainageways, where erosion has caused a 50- to 75-foot drop in elevation from the adjacent uplands. Elevation in the county ranges from 775 feet above sea level to 600 feet. The highest elevation is east of the village of Gays on the Shelbyville Moraine. The lowest elevation is Lake Shelbyville.

The Kaskaskia and West Okaw Rivers (fig. 3) drain most of the county. The Kaskaskia River ultimately drains into the Mississippi River, south of St. Louis. The flood plains along these rivers and their tributaries generally are flooded yearly, and the soils in these areas have a seasonal high water table.

Most areas are sufficiently drained for the crops commonly grown in the county. Subsurface tile drains have been installed in fields across the county, and an extensive system of drainage ditches supplements the natural drainage, especially in the northeastern part of the county.

Natural Resources

Soil is the chief natural resource in Moultrie County. The quality of the soil was recognized by the early settlers who first worked it. The soils are basically well suited to the cultivation of crops, particularly corn and soybeans. Many of the soils are nearly level or gently sloping and formed in medium textured material under tall prairie grasses. Combined with a favorable climate, these factors result in highly productive farmland.

The primary enterprise in the county is farming. In 1988, the value of farm products sold exceeded \$47



Figure 2.—Oat shocks are a familiar sight in the northeastern part of the county, where Amish farmers grow this crop in areas of Drummer and Flanagan soils.

million (Barrett, 1990). Corn and soybeans are the main crops. Some areas are used for wheat, oats, or pasture and hay. Most of the livestock is raised in confinement. In 1987, the county had about 23,945 hogs and pigs and about 5,465 head of cattle and calves (U.S. Department of Commerce, 1987).

The general trend in the county is toward fewer and larger farms. In 1987, the county had 561 farms, which averaged about 329 acres in size (U.S. Department of Commerce, 1987). Farms made up about 184,600

acres, or about 84 percent of the total area of the county. Of this acreage, about 156,910 acres, or 85 percent of the farmland, was used for corn or soybeans; 14,770 acres, or 8 percent, was used for wheat or oats; 9,230 acres, or 5 percent, was used for pasture and hay; and 3,690 acres, or 2 percent, was used as farm woodland (U.S. Department of Commerce, 1987).

At the time of settlement, about 51,400 acres, or 23 percent of the county, was wooded. In 1987, about 12,700 acres, or 6 percent of the county, was wooded



Figure 3.—A picturesque view of the West Okaw River. Colo and Lawson soils are on the flood plain.

(Hahn, 1987). Most of the woodland is along the major streams and their tributaries and along Lake Shelbyville. Most of this land is not tillable and is maintained for conservation reasons. It provides important areas of wildlife habitat.

The county has approximately 6,070 acres of impounded water. Lake Shelbyville makes up about 5,500 acres of this total. The rest of the impounded water is in farm ponds. About half of Lake Shelbyville, which has about 11,000 acres of water, is in Moultrie County. The primary objective of this reservoir, which was completed in 1970, was to control flooding on the

lower Kaskaskia and Mississippi Rivers. Other benefits derived from the reservoir include many recreational opportunities and excellent habitat for fish and other wildlife.

The county has an abundant supply of ground water in the sand and gravel deposits in the fill of buried valleys and in areas where glacial drift is thick. The water supply for Sullivan is obtained from sand and gravel beds in the buried Kaskaskia Valley south of town. Other municipalities and rural residents also depend on ground-water wells.

Climate

Moultrie County is cold in winter and hot in summer. Winter precipitation, which commonly occurs in the form of snow, and early spring rains generally result in the replenishment of soil moisture. In most years the stored moisture in most soils minimizes drought in summer. Normal annual precipitation is adequate for the crops that are suited to the temperature and growing season.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Windsor in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 29 degrees F and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at Windsor on January 24, 1915, is -26 degrees. In summer, the average temperature is 74 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred on July 14, 1936, is 111 degrees.

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

The total annual precipitation is 38.26 inches. Of this, 21.7 inches, or about 57 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall on record was 5.52 inches at Windsor on June 27, 1957. Thunderstorms occur on about 48 days each year, and most occur in July.

The average seasonal snowfall is 21.1 inches. The greatest snow depth at any one time during the period of record was 17 inches. On the average, 8 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 14 inches.

The average relative humidity in midafternoon is about 61 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 71 percent of the time possible in summer and 48 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 14 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a

description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. Unless otherwise indicated, observations and descriptions of the soils were made to a depth of about 60 inches. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar

soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Some of the soil names and boundaries on the soil maps of this survey do not fully agree with those on the soil maps of the surveys of adjacent areas that were completed at a different date. Differences generally are the result of refinements in series concepts, variations in the extent of the soils, slight variations in slope classes, and different ways of describing erosion classes.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

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

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

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

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

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

Soil Descriptions

1. Drummer-Flanagan Association

Nearly level, poorly drained and somewhat poorly drained, silty soils that formed in loess and glacial outwash or in loess and glacial till; on till plains

This association consists of soils on toe slopes, in shallow drainageways and depressions, and on nearly level summits and shoulders. Slopes are long and gradual and range from 0 to 2 percent.

This association makes up about 71 percent of the county. It is about 50 percent Drummer soils, 42 percent Flanagan soils, and 8 percent soils of minor extent (fig. 4).

The poorly drained Drummer soils are on toe slopes and in shallow drainageways and depressions. They formed in 40 to 60 inches of loess and in the underlying glacial outwash. Typically, the surface soil is black, firm silty clay loam about 12 inches thick. The subsoil is about 37 inches thick. It is mottled. The upper part is dark gray and olive gray, firm silty clay loam, and the lower part is light gray, friable silt loam. The substratum

to a depth of 70 inches or more is variegated light brownish gray, brown, and yellowish brown, friable, calcareous, stratified silt loam, loam, sandy loam, silty clay loam, and clay loam.

The somewhat poorly drained Flanagan soils are on nearly level summits and shoulders above the Drummer soils. They formed in 40 to 55 inches of loess and in the underlying loamy glacial till. Typically, the surface soil is black, friable silt loam about 16 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is dark grayish brown, brown, and grayish brown, firm silty clay loam; the next part is light olive brown, friable silt loam; and the lower part is light olive brown, firm loam.

Of minor extent in this association are Dana, Hartsburg, and Peotone soils. The moderately well drained Dana soils are on summits, shoulders, and side slopes above the major soils. The poorly drained Hartsburg soils have secondary calcium carbonates in the subsoil. They are closely intermingled with the areas of the Drummer soils. The very poorly drained Peotone soils are in shallow closed depressions.

Most areas of this association are drained by subsurface tile drains and dredged drainage ditches and are used for cultivated crops. When properly managed, these soils are well suited to the cultivated crops commonly grown in the county, such as corn and soybeans. The content of organic matter is high in the major soils. The main management needs are measures that maintain the present drainage system and measures that maintain tilth and fertility.

Because of ponding, the Drummer soils generally are unsuitable as sites for dwellings and septic tank absorption fields. The Flanagan soils are poorly suited to use as sites for dwellings and septic tank absorption fields because of the seasonal high water table, restricted permeability, and a high shrink-swell potential.

2. Dana-Parr Association

Nearly level to moderately sloping, moderately well drained and well drained, silty and loamy soils that

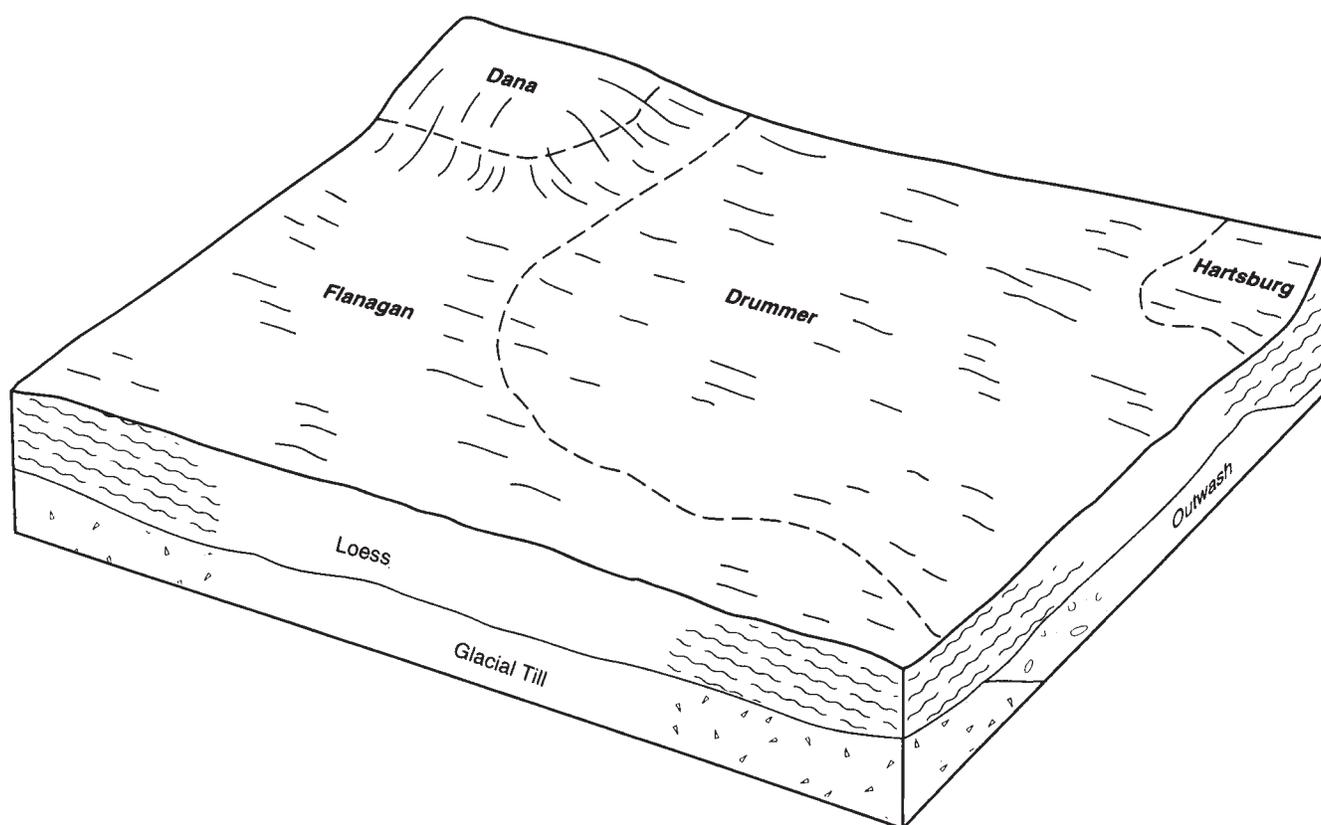


Figure 4.—Typical pattern of soils and parent material in the Drummer-Flanagan association.

formed in loess and glacial till or entirely in glacial till; on till plains

This association consists of soils on summits, shoulders, and short, uneven side slopes along the heads of drainageways on till plains. Slopes range from 0 to 10 percent.

This association makes up about 9 percent of the county. It is about 60 percent Dana soils, 15 percent Parr soils, and 25 percent soils of minor extent (fig. 5).

The moderately well drained Dana soils are nearly level and gently sloping. They are on summits, shoulders, and side slopes. They formed in 22 to 40 inches of loess and in the underlying loamy glacial till. Typically, the surface soil is very dark gray, friable silt loam about 12 inches thick. In some areas it has been thinned by accelerated water erosion. The subsoil extends to a depth of more than 60 inches. It is mottled. The upper part is brown, dark yellowish brown, and yellowish brown, firm silty clay loam; the next part is yellowish brown, firm clay loam; and the lower part is brown, firm, calcareous loam.

The well drained Parr soils are gently sloping and moderately sloping. They are on shoulders and short, uneven side slopes of drainageways. They formed in less than 18 inches of loess and in the underlying loamy glacial till. Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. It has been thinned by accelerated water erosion. The subsoil is about 32 inches thick. It is firm. The upper part is dark yellowish brown silty clay loam; the next part is yellowish brown clay loam; and the lower part is yellowish brown, calcareous loam. The substratum to a depth of 60 inches or more is brown, mottled, firm, calcareous loam.

Of minor extent in this association are Drummer, Flanagan, Lawson, Miami, and Wingate soils. The poorly drained Drummer soils are on toe slopes and in shallow drainageways and depressions. The somewhat poorly drained Flanagan soils are on nearly level summits and shoulders closely intermingled with the major soils. The somewhat poorly drained Lawson soils are on flood plains below the major soils. The well drained, light colored Miami soils are in landscape

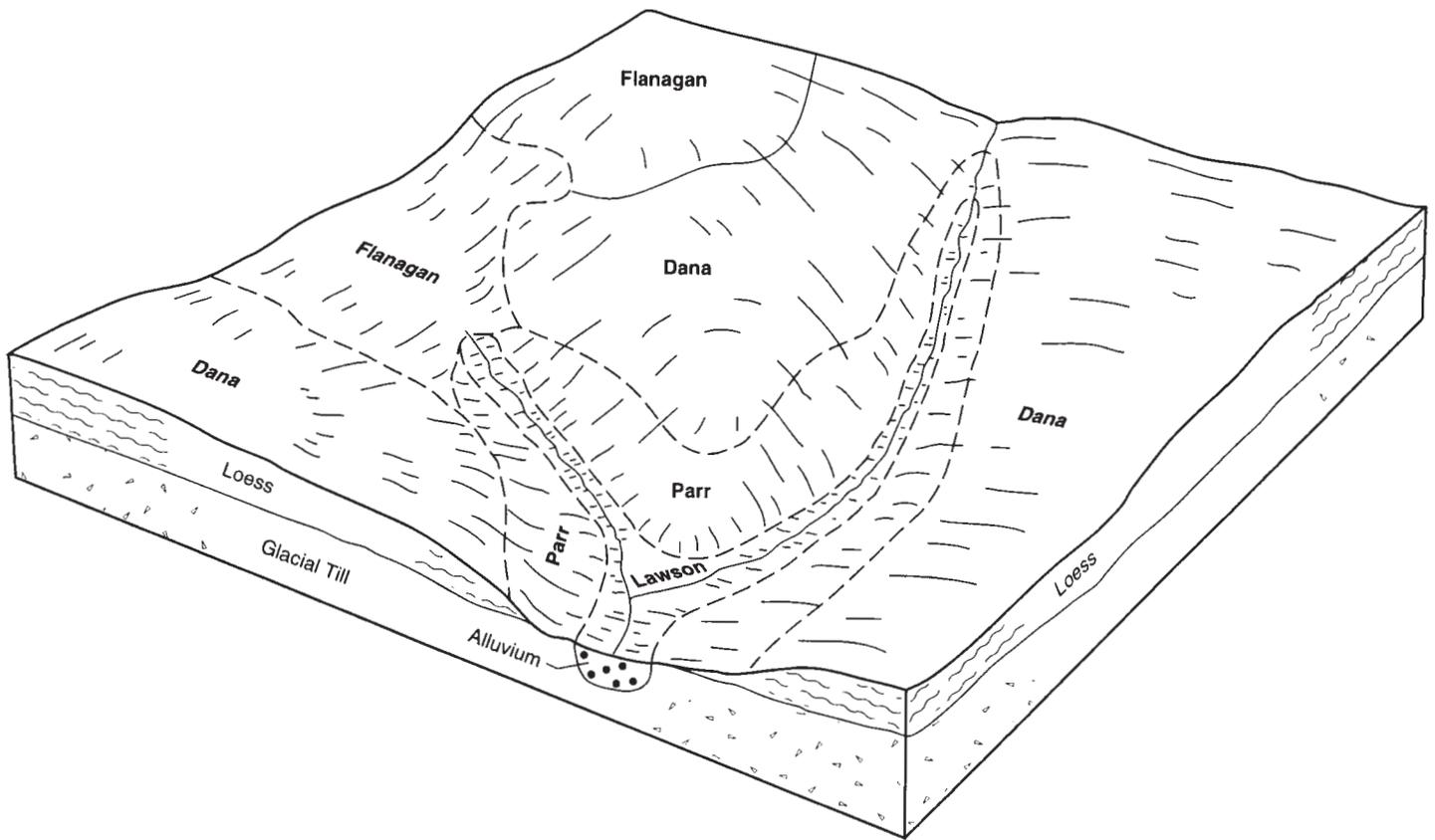


Figure 5.—Typical pattern of soils and parent material in the Dana-Parr association.

positions similar to those of the Parr soils. Wingate soils are moderately well drained and are on summits and side slopes.

Most areas of this association are used for cultivated crops, but some areas are used for pasture and hay. The soils are moderately suited or well suited to the cultivated crops commonly grown in the county. Corn, soybeans, small grain, and hay grow well. The content of organic matter is moderate or high in the major soils. The main management needs are measures that control water erosion and measures that maintain tilth and fertility.

The soils in this association are moderately suited to use as sites for dwellings. The seasonal high water table in the Dana soils and shrinking and swelling of the Dana and Parr soils are the main limitations. The soils are poorly suited to use as sites for septic tank absorption fields. The main limitations are the seasonal high water table in the Dana soils and restricted permeability in the Dana and Parr soils.

3. Xenia-Miami Association

Nearly level to very steep, moderately well drained and well drained, silty and loamy soils that formed in loess and glacial till or entirely in glacial till; on till plains

This association consists of soils on nearly level and gently sloping, convex summits and gently sloping to very steep, uneven side slopes, mainly along major creeks and rivers. Slopes range from 0 to 60 percent.

This association makes up about 17 percent of the county. It is about 39 percent Xenia soils, 35 percent Miami soils, and 26 percent soils of minor extent (fig. 6).

The moderately well drained Xenia soils are nearly level and gently sloping. They are on summits and side slopes above the Miami soils. They formed in 22 to 40 inches of loess and in the underlying loamy glacial till. Typically, the surface soil is brown, friable silt loam about 11 inches thick. The subsoil extends to a depth of more than 60 inches. It is mottled and firm. The upper part is dark yellowish brown and yellowish brown silty

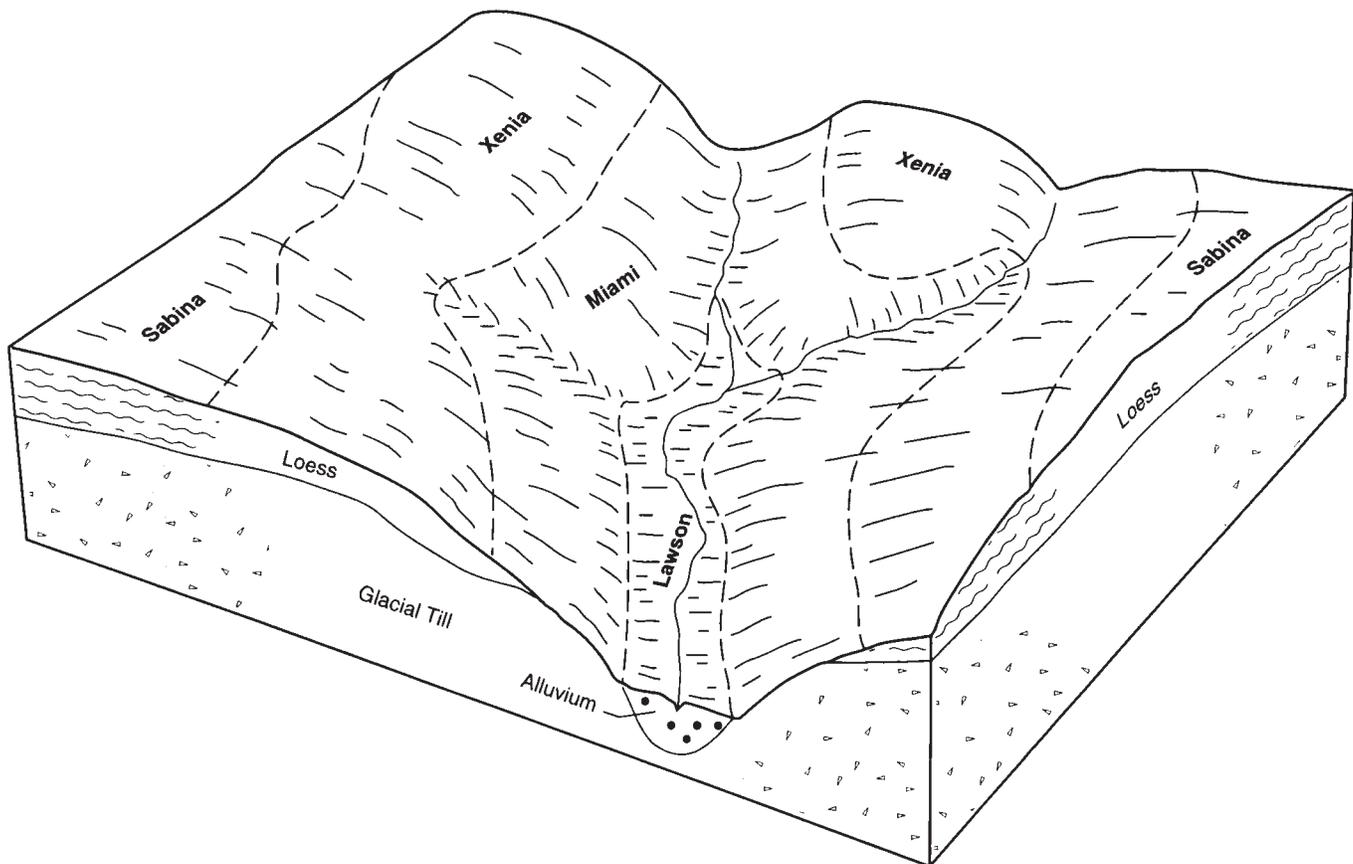


Figure 6.—Typical pattern of soils and parent material in the Xenia-Miami association.

clay loam, and the lower part is dark yellowish brown and brown clay loam.

The well drained Miami soils are gently sloping to very steep. They are on uneven side slopes along drainageways. They formed in less than 18 inches of loess and in the underlying loamy glacial till. Typically, the surface layer is brown, friable loam about 5 inches thick. It has been thinned by accelerated water erosion. The subsurface layer is yellowish brown, friable loam about 4 inches thick. The subsoil is dark yellowish brown and yellowish brown, firm clay loam about 31 inches thick. It is mottled in the lower part. The substratum to a depth of 60 inches or more is brown, mottled, firm, calcareous loam.

Of minor extent in this association are Camden, Colo, Drummer, Lawson, Sabina, Sunbury, and Wingate soils. The well drained Camden soils are on stream terraces. The poorly drained Colo and somewhat poorly drained Lawson soils are on flood plains below the major soils. The poorly drained Drummer soils are in shallow drainageways and depressions. The somewhat

poorly drained Sabina and Sunbury soils and the moderately well drained Wingate soils are on summits, shoulders, and side slopes adjacent to the Xenia soils.

Most areas of this association are used for cultivated crops, pasture, or hay. Some areas are wooded. Most of the woodland in the county is in areas of this association. The soils in the less sloping areas are suited to cultivated crops. The steep and very steep Miami soils are generally unsuited to cultivated crops because of a severe hazard of water erosion. They are suited to woodland and are well suited to use as habitat for woodland wildlife. The deterioration of tilth and the hazard of water erosion are the main management concerns in cultivated areas. The hazard of water erosion, the equipment limitation, and plant competition are the main management concerns affecting woodland.

The soils in this association are poorly suited or moderately suited to use as sites for dwellings. The shrink-swell potential is a limitation. The seasonal high water table in the Xenia soils is a limitation, and the slope is a limitation in some areas of the Miami soils.

The major soils are generally poorly suited to use as sites for septic tank absorption fields. The seasonal high water table in the Xenia soils and restricted permeability in the Miami and Xenia soils are limitations. In some areas of the Miami soils, the slope is an additional limitation.

4. Colo-Lawson Association

Nearly level, poorly drained and somewhat poorly drained, silty soils that formed in alluvium; on flood plains

This association consists of frequently flooded alluvial soils on flood plains along the major creeks and rivers. Slopes range from 0 to 2 percent.

This association makes up about 3 percent of the county. It is about 48 percent Colo soils, 30 percent Lawson soils, and 22 percent soils of minor extent.

Colo soils are poorly drained. Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer also is black, friable silty clay loam. It is about 20 inches thick. The subsoil is very dark gray and dark grayish brown, mottled, firm silty clay loam about 26 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown, mottled, firm silty clay loam.

Lawson soils are somewhat poorly drained. Typically, the surface layer is very dark gray, friable silt loam about 8 inches thick. The subsurface layer is very dark gray and very dark grayish brown, friable silt loam about 24 inches thick. The substratum to a depth of 60 inches or more is dark grayish brown, mottled, friable silt loam and loam.

Of minor extent in this association are Huntsville, Starks, and Tice soils. Huntsville soils are well drained. The somewhat poorly drained Starks soils are on foot slopes of low stream terraces that are frequently flooded. Tice soils are somewhat poorly drained.

In areas where the trees have been cleared and a drainage system has been installed, the soils in this association are moderately suited to the cultivated crops commonly grown in the county. The main management needs are measures that protect the cultivated areas from floodwater, measures that maintain the present drainage system, and measures that maintain tilth and fertility.

The soils in this association generally are moderately suited or well suited to woodland. The seasonal high water table and the hazard of flooding are management concerns. The main management needs are measures that control competing vegetation and measures that protect the woodland from fire and grazing.

Areas of wet Colo soils near Lake Shelbyville are unsuited to cultivated crops and are poorly suited to woodland. These areas, however, are well suited to

use as habitat for wetland wildlife.

Because of the hazard of flooding, the soils in this association generally are unsuited to use as sites for dwellings and septic tank absorption fields.

Broad Land Use Considerations

The soils in Moultrie County vary widely in their suitability for major land uses. Most of the land in the county is used for cultivated crops, dominantly corn and soybeans. The cropland extends throughout the county; some areas in all of the associations are used as cropland. The major soils in associations 1, 2, and 3, with the exception of Miami soils in association 3, generally are well suited to cultivated crops. The moderately sloping Miami soils in association 3 are generally moderately suited to cultivated crops, but the Miami soils in steep or very steep areas are generally unsuited. Wetness is the main limitation in the nearly level areas used for crops. Measures that maintain the present drainage system are needed. The more sloping soils in associations 2 and 3 are susceptible to water erosion. Terraces or cropping and tillage systems that help to control water erosion are needed on these soils. The soils in association 4 are frequently flooded for brief periods, mainly in the winter and spring. The floodwater can delay fieldwork and occasionally causes slight or moderate crop damage.

Only a small acreage in the county is used for pasture and hay. The pastured areas are primarily in association 3. All of the associations in the county generally are suitable for grasses and legumes. The seasonal high water table is a limitation in nearly level areas. Water erosion is the main hazard in associations 2 and 3. In association 3, Miami soils on very steep slopes generally are unsuited to grasses and legumes. Brief periods of flooding can restrict the use of the soils in association 4 for pasture and may delay harvesting of hay in some years.

A small acreage in the county is wooded. The largest areas of woodland are adjacent to creeks, rivers, and Lake Shelbyville. Most of the woodland is in associations 3 and 4. Suitability for trees is good or excellent in all of the associations. The main management concerns are plant competition, the equipment limitation, and the hazard of water erosion. Because of wetness or the slope, the equipment limitation is moderate or severe on some of the soils. On the strongly sloping to very steep slopes, water erosion is a particular hazard during periods when seedlings are becoming established and during logging periods.

A few areas in the county are developed for urban uses. Most of the urban land is in association 1.

Generally, the major soils in association 1 are poorly suited to urban uses, mainly because of the seasonal high water table, the hazard of ponding, restricted permeability, and the shrink-swell potential. The major soils in association 2 and the less sloping Miami soils in association 3 are moderately suited to building site development. The steep and very steep Miami soils in association 3 are generally unsuited to building site development because of the slope. The soils on flood plains, such as those in association 4, are generally unsuitable as sites for buildings because of flooding.

In some areas of the county, private sewage disposal systems are used. Camden soils are well suited to septic tank absorption fields. The seasonal high water table is a major limitation in all of the associations in the county. Alternative waste disposal systems can be used in areas where the water table cannot be sufficiently lowered.

The suitability of the soils in the county for recreational uses ranges from poor to good, depending

on the intensity of use. The soils that are best suited to camp areas and picnic areas are the nearly level and gently sloping soils in association 2 and the less sloping soils in association 3. Soils that have a seasonal high water table and those that are subject to flooding or ponding generally are poorly suited to most intensive recreational uses. These soils are most extensive in associations 1 and 4. The steep and very steep Miami soils in association 3 are limited as sites for most recreational uses. All of the associations are suitable for some recreational uses, such as paths and trails for hiking or horseback riding. Small areas that are suitable for intensive recreational uses generally are available in the associations that otherwise have severe limitations.

The suitability for wildlife habitat generally is good throughout the county. All of the associations have major soils that are generally well suited to habitat for openland wildlife, woodland wildlife, or both. Scattered areas in associations 1 and 4 are suitable for wetland wildlife habitat.

Detailed Soil Map Units

The map units on the detailed soil maps in 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 is given under the heading "Use and Management of the Soils."

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

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

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

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, 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, Miami loam, 5 to 10 percent slopes, eroded, is a phase of the Miami series.

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

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations,

capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

27B2—Miami silt loam, 2 to 5 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 20 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Medium

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Generally moderate; severe on the steeper parts of the slope and in areas where slopes are long

Tilth: Poor; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 6 inches—dark yellowish brown, friable silt loam; fragments of yellowish brown material from the subsoil in the lower part

Subsoil:

6 to 16 inches—yellowish brown, firm silty clay loam

16 to 39 inches—yellowish brown, firm clay loam

Substratum:

39 to 60 inches—brown, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a dark surface layer
- Soils that have a surface layer of loam or clay loam
- Soils that have more than 18 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils in shallow drainageways below the Miami soil
- The somewhat poorly drained Lawson soils on flood plains below the Miami soil
- Soils that have slopes of more than 5 percent

Use and Management

Cropland

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation that includes grasses and legumes and a combination of contour farming, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.
- Terraces help to control water erosion, but they are commonly difficult to install in areas that have short, uneven side slopes.
- Planting short-season or drought-tolerant crop varieties reduces the effects of the limited available water capacity. Leaving crop residue on the surface conserves soil moisture.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concern: Shrink-swell potential

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.

Septic tank absorption fields

Suitability: Poorly suited

Major concern: Permeability

Management considerations:

- The moderately slow permeability in the substratum is a limitation if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIe

Woodland ordination symbol: 5A

27C2—Miami loam, 5 to 10 percent slopes, eroded**Setting**

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 85 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Medium

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Severe

Tilth: Poor; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 5 inches—brown, friable loam; fragments of yellowish brown material from the subsurface layer in the lower part

Subsurface layer:

5 to 9 inches—yellowish brown, friable loam

Subsoil:

9 to 40 inches—dark yellowish brown and yellowish brown, firm clay loam that has mottles in the lower part

Substratum:

40 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a surface layer of clay loam
- Soils that have a thinner solum
- Soils that have more than 18 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils in shallow drainageways below the Miami soil
- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil
- Soils that have slopes of more than 10 percent or less than 5 percent

Use and Management**Cropland**

Suitability: Moderately suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation dominated by grasses and legumes and a combination of contour farming, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.
- Terraces help to control water erosion, but they are commonly difficult to install in areas that have short, uneven side slopes.
- Planting short-season or drought-tolerant crop varieties reduces the effects of the limited available water capacity. Leaving crop residue on the surface conserves soil moisture.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion (fig. 7).
- Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.



Figure 7.—Hay bales in an area of Miami loam, 5 to 10 percent slopes, eroded. Maintaining a cover of grasses and legumes helps to control water erosion in areas of this soil.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.

- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Shrink-swell potential, water erosion

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.
- Sediment trap basins are needed during construction to minimize the sedimentation of surface water.

Septic tank absorption fields

Suitability: Poorly suited

Major concern: Permeability

Management considerations:

- The moderately slow permeability in the substratum is a limitation if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIIe

Woodland ordination symbol: 5A

27C3—Miami clay loam, 5 to 10 percent slopes, severely eroded

Setting

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 30 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Medium

Available water capacity: Low

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Low

Hazard of water erosion: Severe

Tilth: Very poor; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 4 inches—brown, firm clay loam; fragments of dark yellowish brown material from the subsoil throughout

Subsoil:

4 to 33 inches—dark yellowish brown, yellowish brown, and brown, firm clay loam

Substratum:

33 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have slopes of more than 10 percent or less than 5 percent
- Soils that have a surface layer of silty clay loam
- Soils that have a thinner solum

Contrasting inclusions:

- The poorly drained Drummer soils in shallow drainageways below the Miami soil
- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil

Use and Management

Cropland

Suitability: Poorly suited

Major concerns: Water erosion, tilth, low organic matter content

Management considerations:

- A crop rotation dominated by grasses and legumes and a combination of contour farming, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.
- Terraces help to control water erosion, but they are

commonly difficult to install in areas that have short, uneven side slopes.

- Planting short-season or drought-tolerant crop varieties reduces the effects of the limited available water capacity. Leaving crop residue on the surface conserves soil moisture.
- Returning crop residue to the soil and regularly adding other organic material minimize surface compaction and crusting, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Moderately suited

Major concerns: Water erosion, tilth

Management considerations:

- Maintaining a cover of grasses and legumes improves tilth and helps to control water erosion.
- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- Seedbed preparation is difficult on severely eroded side slopes where the subsoil is exposed.
- Using a no-till method of seeding or pasture renovation helps to establish forage species and helps to control water erosion.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and minimize surface compaction and excessive runoff.

Woodland

Suitability: Moderately suited

Major concerns: Water erosion, plant competition

Management considerations:

- Water erosion can be controlled by restricting harvesting operations to periods when the soil is dry or frozen; by installing erosion-control measures, such as water breaks, on haul roads and skid trails; and by seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- If food plots of grain or seed crops are planted, using a conservation tillage system, no-till farming, or farming on the contour reduces the hazard of water erosion.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Shrink-swell potential, water erosion

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.
- Sediment trap basins are needed during construction to minimize the sedimentation of surface water.

Septic tank absorption fields

Suitability: Poorly suited

Major concern: Permeability

Management considerations:

- The moderately slow permeability in the substratum is a limitation if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IVE

Woodland ordination symbol: 5A

27D—Miami loam, 10 to 18 percent slopes

Setting

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 35 acres

Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Rapid

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Severe

Tilth: Fair

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 5 inches—very dark grayish brown, friable loam

Subsurface layer:

5 to 9 inches—yellowish brown, friable loam

Subsoil:

9 to 40 inches—dark yellowish brown, firm clay loam that has mottles in the lower part

Substratum:

40 to 60 inches—yellowish brown, mottled, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thinner solum
- Soils that contain less clay in the subsoil
- Soils that are eroded

Contrasting inclusions:

- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil
- The moderately well drained Xenia soils on convex summits above the Miami soil

Use and Management

Cropland

Suitability: Generally not used for crops

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- Using a no-till method of seeding or pasture renovation helps to establish forage species and helps to control water erosion.
- The plants should not be grazed or clipped until they are sufficiently established.
- Caution is needed if machinery is operated on the steeper slopes.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for woodland wildlife

Management considerations:

- The existing stands of trees provide good habitat for deer, squirrels, raccoons, songbirds, raptors, and other woodland wildlife.
- Trees and shrubs can be easily established in cleared areas.
- Protecting the stands from uncontrolled fire and grazing helps to prevent destruction of the leaf mulch and of desirable young trees, shrubs, and sprouts, which provide food and cover for wildlife.
- This soil is suitable for grain and seed crops and wild herbaceous plants, all of which are needed in areas of

woodland wildlife habitat. Food plots of grain or seed crops should be planted in open areas where sunlight is available. A conservation tillage system, no-till farming, or farming on the contour reduces the hazard of water erosion.

Dwellings

Suitability: Moderately suited

Major concerns: Shrink-swell potential, slope, water erosion

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- When sites for dwellings are being prepared, land shaping by cutting and filling helps to overcome the slope.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.
- Sediment trap basins are needed during construction to minimize the sedimentation of surface water.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Permeability, slope

Management considerations:

- The slope and the moderately slow permeability in the substratum are limitations if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.
- Installing distribution lines on the contour or land shaping by cutting and filling helps to overcome the slope.

Interpretive Groups

Land capability classification: IVe

Woodland ordination symbol: 5A

27D2—Miami loam, 10 to 18 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 125 acres

Major use: Pasture and hay

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Rapid

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Severe

Tilth: Poor; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 7 inches—brown, friable loam; fragments of dark yellowish brown material from the subsoil in the lower part

Subsoil:

7 to 35 inches—dark yellowish brown and yellowish brown, firm clay loam

Substratum:

35 to 60 inches—yellowish brown, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a surface layer of clay loam
- Soils that have a thinner solum

Contrasting inclusions:

- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil
- The moderately well drained Xenia soils on convex summits above the Miami soil
- Soils that have slopes of less than 10 percent or more than 18 percent

Use and Management

Cropland

Suitability: Poorly suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation dominated by grasses and legumes and a combination of contour farming, grassed waterways, no-till planting (fig. 8), or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.



Figure 8.—No-till corn planted into wheat residue in an area of Miami loam, 10 to 18 percent slopes, eroded.

- Terraces help to control water erosion, but they are commonly difficult to install in areas that have short, uneven side slopes.
- Planting short-season or drought-tolerant crop varieties helps to overcome the limited available water capacity. Leaving crop residue on the surface conserves soil moisture.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tith

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tith and fertility

and helps to control water erosion.

- Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- Using a no-till method of seeding or pasture renovation helps to establish forage species and helps to control water erosion.
- The plants should not be grazed or clipped until they are sufficiently established.
- Caution is needed if machinery is operated on the steeper slopes.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good

condition and help to control water erosion.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for woodland wildlife

Management considerations:

- The existing stands of trees provide good habitat for deer, squirrels, raccoons, songbirds, raptors, and other woodland wildlife.
- Trees and shrubs can be easily established in cleared areas.
- Protecting the stands from uncontrolled fire and grazing helps to prevent destruction of the leaf mulch and of desirable young trees, shrubs, and sprouts, which provide food and cover for wildlife.
- This soil is suitable for grain and seed crops and wild herbaceous plants, all of which are needed in areas of woodland wildlife habitat. Food plots of grain or seed crops should be planted in open areas where sunlight is available. A conservation tillage system, no-till farming, or farming on the contour reduces the hazard of water erosion.

Dwellings

Suitability: Moderately suited

Major concerns: Shrink-swell potential, slope, water erosion

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- When sites for dwellings are being prepared, land shaping by cutting and filling helps to overcome the slope.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.
- Sediment trap basins are needed during construction to minimize the sedimentation of surface water.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Permeability, slope

Management considerations:

- The slope and the moderately slow permeability in the substratum are limitations if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.
- Installing distribution lines on the contour or land shaping by cutting and filling helps to overcome the slope.

Interpretive Groups

Land capability classification: IVe

Woodland ordination symbol: 5A

27D3—Miami clay loam, 10 to 18 percent slopes, severely eroded

Setting

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 50 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Rapid

Available water capacity: Low

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Low

Hazard of water erosion: Severe

Tilth: Very poor; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 3 inches—brown, firm clay loam; fragments of dark yellowish brown material from the subsoil throughout

Subsoil:

3 to 25 inches—dark yellowish brown and yellowish brown, firm clay loam

25 to 30 inches—brown, mottled, friable, calcareous loam

Substratum:

30 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions**Similar soils:**

- Soils that have a thinner solum
- Soils that are less eroded

Contrasting inclusions:

- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil
- The moderately well drained Xenia soils on convex summits above the Miami soil

Use and Management**Cropland**

Suitability: Generally unsuited because of the severe hazard of water erosion

Pasture and hay

Suitability: Moderately suited

Major concerns: Water erosion, tilth

Management considerations:

- Maintaining a cover of grasses and legumes improves tilth and helps to control water erosion (fig. 9).
- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.
- Seedbed preparation is difficult on severely eroded side slopes where the subsoil is exposed. Using a no-till method of seeding or pasture renovation helps to establish forage species and helps to control water erosion.
- The plants should not be grazed or clipped until they are sufficiently established.
- Caution is needed if machinery is operated on the steeper slopes.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and minimize surface compaction and excessive runoff.

Woodland

Suitability: Moderately suited

Major concerns: Water erosion, plant competition

Management considerations:

- Water erosion can be controlled by restricting harvesting operations to periods when the soil is dry or frozen; by installing erosion-control measures, such as water breaks, on haul roads and skid trails; and by seeding bare areas to grass or to a grass-legume

mixture after logging activities have been completed.

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Moderately suited to use as habitat for openland wildlife

Major concern: Water erosion

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- If food plots of grain or seed crops are planted, using a conservation tillage system, no-till farming, or farming on the contour reduces the hazard of water erosion.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Shrink-swell potential, slope, water erosion

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- When sites for dwellings are being prepared, land shaping by cutting and filling helps to overcome the slope.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and



Figure 9.—Hay being cut in an area of Miami clay loam, 10 to 18 percent slopes, severely eroded.

maintaining a cover of mulch until seedlings are established help to control water erosion.

- Sediment trap basins are needed during construction to minimize the sedimentation of surface water.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Permeability, slope

Management considerations:

- The slope and the moderately slow permeability in the substratum are limitations if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

- Installing distribution lines on the contour or land shaping by cutting and filling helps to overcome the slope.

Interpretive Groups

Land capability classification: V1e

Woodland ordination symbol: 5A

27F—Miami loam, 18 to 35 percent slopes

Setting

Landform: Till plains

Position on the landform: Uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 380 acres

Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Rapid

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Severe

Tilth: Unsuitable for cultivation

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 3 inches—very dark grayish brown, friable loam

Subsurface layer:

3 to 7 inches—dark brown, friable loam

Subsoil:

7 to 36 inches—dark yellowish brown and yellowish brown, firm clay loam that has mottles in the lower part

Substratum:

36 to 60 inches—yellowish brown, mottled, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thinner solum
- Soils that are eroded

Contrasting inclusions:

- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil
- The moderately well drained Xenia soils on convex summits above the Miami soil
- Soils that have slopes of less than 18 percent or more than 35 percent

Use and Management

Cropland

Suitability: Generally unsuited because of the slope

Pasture and hay

Suitability: Moderately suited

Major concerns: Water erosion, slope

Management considerations:

- Maintaining a cover of grasses and legumes helps to

control water erosion in pastured areas.

- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.
- Using a no-till method of seeding or pasture renovation helps to establish forage species and helps to control water erosion.
- The plants should not be grazed or clipped until they are sufficiently established.
- Caution is needed if machinery is operated on the steeper slopes.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Woodland

Suitability: Moderately suited

Major concerns: Water erosion, equipment limitation, plant competition

Management considerations:

- The slope increases the hazard of water erosion and limits the use of machinery. Machinery should be used only during periods when the soil is firm.
- Water erosion can be controlled by laying out logging roads and skid trails on or nearly on the contour, skidding logs or trees uphill with a cable and winch on the steeper slopes, establishing grass firebreaks, and seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for woodland wildlife

Major concerns: Water erosion, slope

Management considerations:

- The dense stands of timber provide good habitat for deer, raccoons, squirrels, songbirds, raptors, and other woodland wildlife.
- Plantings for food and cover are difficult to establish and maintain because of the slope and the hazard of water erosion. Food plots of grain or seed crops should be established only in the less sloping areas. Also, the crops should be planted on the contour.
- Measures that protect the habitat from uncontrolled

fire and livestock grazing minimize the depletion of the shrubs and sprouts that provide food and cover for wildlife.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the restricted permeability and the slope

Interpretive Groups

Land capability classification: VIe

Woodland ordination symbol: 5R

27G—Miami loam, 35 to 60 percent slopes

Setting

Landform: Till plains

Position on the landform: Uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 265 acres

Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Rapid

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Severe

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 6 inches—very dark grayish brown, friable loam

Subsoil:

6 to 26 inches—brown and yellowish brown, firm clay loam

26 to 31 inches—yellowish brown, friable, calcareous loam

Substratum:

31 to 60 inches—brown, firm, calcareous loam

Composition

Miami and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thinner solum

Contrasting inclusions:

- The somewhat poorly drained Lawson and poorly drained Colo soils on flood plains below the Miami soil
- The moderately well drained Xenia soils on convex summits above the Miami soil
- Soils that have slopes of less than 35 percent or more than 60 percent

Use and Management

Cropland and pasture and hay

Suitability: Generally unsuited because of the slope

Woodland

Suitability: Poorly suited

Major concerns: Water erosion, equipment limitation, plant competition

Management considerations:

- The slope increases the hazard of water erosion and limits the use of machinery. Machinery should be used only during periods when the soil is firm.
- Water erosion can be controlled by laying out logging roads and skid trails on or nearly on the contour, skidding logs or trees uphill with a cable and winch on the steeper slopes, establishing grass firebreaks, and seeding bare areas to grass or to a grass-legume mixture after logging activities have been completed.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for woodland wildlife

Major concerns: Water erosion, slope

Management considerations:

- The dense stands of timber provide good habitat for deer, raccoons, squirrels, songbirds, raptors, and other woodland wildlife.
- Plantings for food and cover are difficult to establish and maintain because of the slope and the hazard of water erosion. Food plots of grain or seed crops should be established only in the less sloping areas. Also, the crops should be planted on the contour.
- Measures that protect the habitat from uncontrolled fire and livestock grazing minimize the depletion of the shrubs and sprouts that provide food and cover for wildlife.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the restricted permeability and the slope

Interpretive Groups

Land capability classification: VIIe

Woodland ordination symbol: 5R

56A—Dana silt loam, 0 to 2 percent slopes**Setting**

Landform: Till plains

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 3 to 150 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 3 to 6 feet from March through April

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface soil:

0 to 12 inches—very dark gray, friable silt loam

Subsoil:

12 to 39 inches—brown, dark yellowish brown, and yellowish brown, firm silty clay loam that has mottles in the lower part

39 to 49 inches—yellowish brown, mottled, firm clay loam

49 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Dana and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

Inclusions

Similar soils:

- Soils that have a thinner surface layer
- Soils that have more than 40 inches of loess overlying the loamy glacial till
- Soils that are somewhat poorly drained

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Dana soil

Use and Management**Cropland**

Suitability: Well suited

Management considerations:

- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material help to maintain tilth and fertility.

Pasture and hay

Suitability: Well suited

Management considerations:

- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a limitation on sites for dwellings without basements.
- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Installing subsurface drains near the perimeter of the absorption field lowers the seasonal high water table.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: 1

56B2—Dana silt loam, 2 to 5 percent slopes, eroded**Setting**

Landform: Till plains

Position on the landform: Convex summits and side slopes

Shape of areas: Irregular

Size of areas: 3 to 205 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Medium

Available water capacity: High

Seasonal high water table: At a depth of 3 to 6 feet from March through April

Organic matter content: Moderate

Hazard of water erosion: Moderate; may be severe, especially on the steeper parts of the slope and where slopes are long

Tilth: Fair

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile**Surface layer:**

0 to 9 inches—very dark grayish brown, friable silt loam; fragments of brown material from the subsoil in the lower part

Subsoil:

9 to 33 inches—brown and dark yellowish brown, firm silty clay loam that has mottles in the lower part
33 to 54 inches—dark yellowish brown, mottled, firm clay loam

Substratum:

54 to 60 inches—yellowish brown, mottled, firm, calcareous loam

Composition

Dana and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions**Similar soils:**

- Soils that have a thinner surface layer
- Soils that are well drained
- Soils that have less than 22 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Dana soil
- The somewhat poorly drained Flanagan soils on nearly level summits and shoulders below the Dana soil

Use and Management**Cropland**

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation that includes grasses and legumes and a combination of contour farming, terraces, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.

- The plants should not be grazed or clipped until they are sufficiently established.
- Overgrazing or grazing when the soil is too wet reduces forage production, causes surface compaction and excessive runoff, and increases the hazard of water erosion.
- Applications of fertilizer, weed control, rotation grazing, proper stocking rates, deferred grazing, restricted use during wet periods, and timely harvesting help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a limitation on sites for dwellings without basements.
- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are

established help to control water erosion.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Installing interceptor drains higher on the side slopes than the absorption field helps to intercept seepage water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIe

134A—Camden silt loam, 0 to 2 percent slopes

Setting

Landform: Stream terraces

Position on the landform: Nearly level summits

Shape of areas: Irregular or oblong

Size of areas: 3 to 50 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderate

Parent material: Loess and glacial outwash

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Slight

Tilth: Fair; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 9 inches—brown, friable silt loam

Subsurface layer:

9 to 12 inches—dark yellowish brown, friable silt loam

Subsoil:

12 to 33 inches—dark yellowish brown, firm silty clay loam

33 to 48 inches—dark yellowish brown, friable sandy loam

48 to 60 inches—brown, firm sandy clay loam

Composition

Camden and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have more gravel in the lower part of the subsoil
- Soils that have more sand in the upper part of the subsoil
- Soils that have less sand in the lower part of the subsoil
- Soils that are moderately well drained and have a seasonal high water table within a depth of 6 feet

Contrasting inclusions:

- The somewhat poorly drained Starks soils on foot slopes below the Camden soil

Use and Management

Cropland

Suitability: Well suited

Major concern: Tilth

Management considerations:

- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize crusting and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concern: Tilth

Management considerations:

- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Overgrazing reduces forage production and results in surface compaction, excessive runoff, and the deterioration of tilth.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to

prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.

- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbance until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Well suited to use as a site for dwellings with basements, moderately suited to use as a site for dwellings without basements

Major concern: Shrink-swell potential

Management considerations:

- On sites for dwellings without basements, extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Well suited

Management considerations:

- No major limitations affect the use of this soil as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: I

Woodland ordination symbol: 7A

134B2—Camden silt loam, 2 to 5 percent slopes, eroded

Setting

Landform: Stream terraces

Position on the landform: Convex summits and side slopes

Shape of areas: Irregular or oblong

Size of areas: 3 to 60 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderate

Parent material: Loess and glacial outwash

Surface runoff: Medium

Available water capacity: High

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderately low

Hazard of water erosion: Moderate; may be severe, especially on the steeper parts of the slope and where slopes are long

Tilth: Poor; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 6 inches—brown, friable silt loam; fragments of dark yellowish brown material from the subsoil in the lower part

Subsoil:

6 to 26 inches—dark yellowish brown, firm silty clay loam

26 to 44 inches—dark yellowish brown and strong brown, firm clay loam and sandy clay loam

44 to 60 inches—brown, friable sandy loam

Composition

Camden and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have more sand in the surface layer
- Soils that have more gravel in the subsoil
- Soils that have more than 40 inches of loess overlying the glacial outwash

Contrasting inclusions:

- The somewhat poorly drained Starks soils on foot slopes below the Camden soil

Use and Management

Cropland

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation that includes grasses and legumes and a combination of contour farming, terraces, stripcropping, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion (fig. 10).

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Overgrazing reduces forage production, causes surface compaction and excessive runoff, and increases the hazard of water erosion.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and



Figure 10.—Sunflowers grow well in areas of Camden silt loam, 2 to 5 percent slopes, eroded. Leaving the residue from this crop on the surface after harvest helps to control water erosion and improves tilth.

cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.

- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.

- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1.

Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.

- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.

- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Well suited to use as a site for dwellings with basements, moderately suited to use as a site for dwellings without basements

Major concern: Shrink-swell potential

Management considerations:

- On sites for dwellings without basements, extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.

Septic tank absorption fields

Suitability: Well suited

Management considerations:

- No major limitations affect the use of this soil as a site for septic tank absorption fields.

Interpretive Groups

Land capability classification: IIe

Woodland ordination symbol: 7A

152—Drummer silty clay loam

Setting

Landform: Till plains

Position on the landform: Toe slopes and shallow drainageways and depressions

Slope: 0 to 2 percent

Ponding: Water may be ponded 0.5 foot above the surface for brief periods from March through June and may damage crops in some years.

Size of areas: 3 to more than 42,500 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained

Permeability: Moderate

Parent material: Loess and glacial outwash

Surface runoff: Slow to ponded

Available water capacity: High

Seasonal high water table: 0.5 foot above to 2.0 feet below the surface from March through June

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Fair; the surface layer becomes compacted and cloddy if it is plowed when too wet.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface soil:

0 to 12 inches—black, firm silty clay loam

Subsoil:

12 to 42 inches—dark gray and olive gray, mottled, firm silty clay loam

42 to 49 inches—gray, mottled, friable silt loam

Substratum:

49 to 70 inches—variegated light brownish gray, brown, and yellowish brown, mottled, friable, calcareous, stratified silt loam, loam, sandy loam, silty clay loam, and clay loam

Composition

Drummer and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

Inclusions

Similar soils:

- Soils that contain more clay and are darker in the upper part of the subsoil
- Soils that have more sand in the lower part of the subsoil and in the substratum
- Soils that have carbonates within a depth of 35 inches

Contrasting inclusions:

- The moderately well drained Dana soils on summits, shoulders, and side slopes above the Drummer soil
- The somewhat poorly drained Flanagan soils on nearly level summits and shoulders above the Drummer soil
- The very poorly drained Peotone soils in shallow closed depressions

Use and Management

Cropland

Suitability: Well suited if adequately drained

Major concerns: Ponding, wetness, tilth

Management considerations:

- Corn, soybeans, and small grain can be grown in most areas because a drainage system has been installed.
- Wetness delays planting or damages crops in some years. Measures that maintain the present drainage system are needed.
- Tilling when the soil is wet causes surface compaction and cloddiness.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and cloddiness, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited if adequately drained

Major concerns: Ponding, wetness, tilth

Management considerations:

- The seasonal high water table and the ponding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.
- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and the deterioration of tilth.
- Applications of fertilizer, weed control, rotation grazing, proper stocking rates, deferred grazing, restricted use during wet periods, and timely harvesting help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The frequent ponding and the seasonal high water table provide good habitat for mink, frogs, salamanders, ducks, herons, songbirds, and other wetland wildlife.
- Shallow ponds and marshes can be created by blocking natural channels and manmade drainage systems.
- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redbud, and reed canarygrass provide food and cover for wetland wildlife.
- Measures that protect the area from fire and grazing are needed.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: IIw

154A—Flanagan silt loam, 0 to 2 percent slopes**Setting**

Landform: Till plains

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 3 to 1,040 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: Very high

Seasonal high water table: At a depth of 1.5 to 3.5 feet from March through June

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: High

Potential for frost action: High

Typical Profile

Surface soil:

0 to 16 inches—black, friable silt loam

Subsoil:

16 to 41 inches—dark grayish brown, brown, and grayish brown, mottled, firm silty clay loam

41 to 48 inches—light olive brown, mottled, friable silt loam

48 to 60 inches—light olive brown, mottled, firm loam

Composition

Flanagan and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thinner surface layer
- Soils that have less clay in the subsoil
- Soils that have less than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The moderately well drained Dana soils on side slopes and the higher summits
- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Flanagan soil
- Areas that have slopes of more than 2 percent

Use and Management**Cropland**

Suitability: Well suited

Management considerations:

- The seasonal high water table can delay planting in some years.
- Subsurface tile drains have been installed in most areas and function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

Pasture and hay

Suitability: Well suited

Management considerations:

- The seasonal high water table restricts the growth of some forage crops and limits the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and big bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Poorly suited

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a limitation on sites for dwellings without basements.
- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- When sites for dwellings are being prepared, grading

and land shaping help to remove excess surface water.

- Reinforcing the foundation, widening foundation trenches, and backfilling with suitable fill material help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Subsurface drains lower the seasonal high water table.
- Grading and land shaping by cutting and filling help to remove excess surface water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: I

221B2—Parr silt loam, 2 to 5 percent slopes, eroded**Setting**

Landform: Till plains

Position on the landform: Shoulders and short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 75 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Medium

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderate

Hazard of water erosion: Moderate; may be severe, especially on the steeper parts of the slope and where slopes are long

Tilth: Fair

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 8 inches—very dark gray, friable silt loam;

fragments of dark yellowish brown material from the subsoil in the lower part

Subsoil:

8 to 15 inches—dark yellowish brown, firm silty clay loam

15 to 35 inches—yellowish brown, firm clay loam

35 to 40 inches—yellowish brown, firm, calcareous loam

Substratum:

40 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Parr and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thicker surface layer
- Soils that have a surface layer of silty clay loam or clay loam and are more eroded
- Soils that have more than 18 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils in shallow drainageways and depressions below the Parr soil
- The somewhat poorly drained Flanagan soils on nearly level summits and shoulders

Use and Management

Cropland

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation that includes grasses and legumes and a combination of contour farming, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.
- Terraces help to control water erosion, but they are commonly difficult to install in areas that have short, uneven side slopes.
- Planting short-season or drought-tolerant crop varieties helps to overcome the limited available water capacity. Leaving crop residue on the surface conserves soil moisture.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.

- Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concern: Shrink-swell potential

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.

Septic tank absorption fields

Suitability: Poorly suited

Major concern: Permeability

Management considerations:

- The moderately slow permeability in the substratum is

a limitation if this soil is used as a site for septic tank absorption fields.

- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIe

221C2—Parr loam, 5 to 10 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Short, uneven side slopes

Shape of areas: Long and narrow

Size of areas: 3 to 120 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderately slow

Parent material: Glacial till

Surface runoff: Medium

Available water capacity: Moderate

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderate

Hazard of water erosion: Severe

Tilth: Fair

Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:

0 to 7 inches—very dark gray, friable loam; fragments of dark yellowish brown material from the subsoil in the lower part

Subsoil:

7 to 29 inches—dark yellowish brown and yellowish brown, firm clay loam

29 to 35 inches—yellowish brown, mottled, firm loam

Substratum:

35 to 60 inches—yellowish brown, mottled, firm, calcareous loam

Composition

Parr and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thicker surface layer
- Soils that have a surface layer of silty clay loam or

clay loam and that are more eroded

Contrasting inclusions:

- The poorly drained Drummer soils in shallow drainageways below the Parr soil
- The somewhat poorly drained Flanagan soils on nearly level summits and shoulders

Use and Management

Cropland

Suitability: Moderately suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation dominated by grasses and legumes and a combination of contour farming, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.
- Terraces help to control water erosion, but they are commonly difficult to install in areas that have short, uneven side slopes.
- Planting short-season or drought-tolerant crop varieties helps to overcome the limited available water capacity. Leaving crop residue on the surface conserves soil moisture.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass.

Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.

- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Shrink-swell potential, water erosion

Management considerations:

- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.
- Sediment trap basins are needed during construction to minimize the sedimentation of surface water.

Septic tank absorption fields

Suitability: Poorly suited

Major concern: Permeability

Management considerations:

- The moderately slow permeability in the substratum is a limitation if this soil is used as a site for septic tank absorption fields.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIIe

234A—Sunbury silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 3 to 55 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1.5 to 3.5 feet from March through June

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: High

Potential for frost action: High

Typical Profile

Surface layer:

0 to 8 inches—very dark grayish brown, friable silt loam

Subsoil:

8 to 12 inches—brown, mottled, friable silty clay loam

12 to 43 inches—yellowish brown, mottled, firm silty clay loam

43 to 48 inches—yellowish brown, mottled, firm clay loam

Substratum:

48 to 60 inches—light olive brown, mottled, firm, calcareous loam

Composition

Sunbury and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thicker dark surface layer
- Soils that have a light colored surface layer
- Soils that have less than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Sunbury soil
- The moderately well drained Wingate soils on the more sloping summits

Use and Management

Cropland

Suitability: Well suited

Management considerations:

- The seasonal high water table can delay planting in some years.
- Subsurface tile drains have been installed in most areas and function satisfactorily if suitable outlets are available.

- Measures that maintain the present drainage system are needed.
- A conservation tillage system that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

Pasture and hay

Suitability: Well suited

Management considerations:

- The seasonal high water table restricts the growth of some forage crops and limits the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and big bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Poorly suited

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a

limitation on sites for dwellings without basements.

- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- When sites for dwellings are being prepared, grading and land shaping help to remove excess surface water.
- Reinforcing the foundation, widening foundation trenches, and backfilling with suitable fill material help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Subsurface drains lower the seasonal high water table.
- Grading and land shaping by cutting and filling help to remove excess surface water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: I

236A—Sabina silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 3 to 125 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1.5 to 3.5 feet from March through June

Organic matter content: Moderately low

Hazard of water erosion: Slight

Tilth: Fair; the surface layer tends to crust after hard rains.

Shrink-swell potential: High

Potential for frost action: High

Typical Profile

Surface layer:

0 to 9 inches—dark grayish brown, friable silt loam

Subsurface layer:

9 to 13 inches—brown, mottled, friable silt loam

Subsoil:

13 to 17 inches—brown, mottled, firm silty clay loam

17 to 28 inches—brown, mottled, very firm silty clay

28 to 44 inches—grayish brown and brown, mottled, firm silty clay loam

44 to 51 inches—brown, mottled, firm clay loam

51 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Sabina and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a dark surface layer
- Soils that contain less clay in the subsoil
- Soils that have less than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Sabina soil
- The moderately well drained Xenia soils on summits and side slopes

Use and Management

Cropland

Suitability: Well suited

Major concerns: Wetness, tilth

Management considerations:

- The seasonal high water table can delay planting in some years.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and crusting, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Wetness, tilth

Management considerations:

- Subsurface tile drains have been installed in most

areas and function satisfactorily if suitable outlets are available.

- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Poorly suited

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a limitation on sites for dwellings without basements.
- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- When sites for dwellings are being prepared, grading and land shaping help to remove excess surface water.
- Reinforcing the foundation, widening foundation trenches, and backfilling with suitable fill material help to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Subsurface drains lower the seasonal high water table.
- Grading and land shaping by cutting and filling help to remove excess surface water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIw

Woodland ordination symbol: 4A

244—Hartsburg silty clay loam**Setting**

Landform: Till plains

Position on the landform: Toe slopes and shallow depressions

Slope: 0 to 2 percent

Ponding: Water may be ponded 0.5 foot above the surface for brief periods from March through June and can damage crops in most years.

Shape of areas: Irregular or rounded

Size of areas: 3 to 85 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained

Permeability: Moderate

Parent material: Loess

Surface runoff: Slow to ponded

Available water capacity: High

Seasonal high water table: 0.5 foot above to 2.0 feet below the surface from March through June

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Fair; the surface layer becomes compacted and cloddy if it is plowed when too wet.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 9 inches—black, firm silty clay loam

Subsurface layer:

9 to 13 inches—very dark grayish brown, mottled, firm silty clay loam

Subsoil:

13 to 17 inches—dark grayish brown, mottled, firm silty clay loam

17 to 41 inches—gray, mottled, firm, calcareous silty clay loam

Substratum:

41 to 60 inches—gray, mottled, friable, calcareous silt loam

Composition

Hartsburg and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that contain more clay and are darker in the upper part of the subsoil
- Soils that have loam or clay loam glacial outwash below a depth of 40 inches
- Soils that have carbonates within a depth of 15 inches

Contrasting inclusions:

- The somewhat poorly drained Flanagan soils on nearly level summits and shoulders above the Hartsburg soil

Use and Management**Cropland**

Suitability: Well suited if adequately drained

Major concerns: Ponding, wetness, tilth

Management considerations:

- Corn, soybeans, and small grain can be grown in most areas because a drainage system has been installed.
- Wetness delays planting or damages crops in some

years. Measures that maintain the present drainage system are needed.

- Tilling when the soil is wet causes surface compaction and cloddiness.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and cloddiness, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited if adequately drained

Major concerns: Ponding, wetness, tilth

Management considerations:

- The seasonal high water table and the ponding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.
- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and the deterioration of tilth.
- Applications of fertilizer, weed control, rotation grazing, proper stocking rates, deferred grazing, restricted use during wet periods, and timely harvesting help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The frequent ponding and the seasonal high water table provide good habitat for mink, frogs, salamanders, ducks, herons, songbirds, and other wetland wildlife.
- Shallow ponds and marshes can be created by blocking natural channels and manmade drainage systems.
- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redtop, and reed canarygrass provide food and cover for wetland wildlife.
- Measures that protect the area from fire and grazing are needed.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: 1lw

291A—Xenia silt loam, 0 to 2 percent slopes

Setting

Landform: Till plains

Position on the landform: Nearly level summits

Shape of areas: Irregular

Size of areas: 3 to 200 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 2.0 to 3.5 feet from December through April

Organic matter content: Moderately low

Hazard of water erosion: Slight

Tilth: Fair; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface soil:

0 to 11 inches—brown, friable silt loam

Subsoil:

11 to 39 inches—dark yellowish brown and yellowish brown, mottled, firm silty clay loam

39 to 60 inches—dark yellowish brown and brown, mottled, firm clay loam

Composition

Xenia and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that are well drained
- Soils that have more than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Xenia soil
- The somewhat poorly drained Sabina and Sunbury soils on nearly level summits and shoulders

Use and Management

Cropland

Suitability: Well suited

Major concern: Tilth

Management considerations:

- Using a conservation tillage system that leaves crop

residue on the surface after planting and regularly adding other organic material minimize crusting and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concern: Tilth

Management considerations:

- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Overgrazing reduces forage production and causes surface compaction, excessive runoff, and the deterioration of tilth.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and

untilled throughout the winter improve the habitat.

- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited to use as a site for dwellings without basements, poorly suited to use as a site for dwellings with basements

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table is a limitation on sites for dwellings, especially dwellings with basements. The shrink-swell potential is an additional limitation on sites for dwellings without basements.
- Installing subsurface drains near the foundation helps to remove excess water.
- On sites for dwellings without basements, extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Installing subsurface drains near the perimeter of the absorption field lowers the seasonal high water table.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: I

Woodland ordination symbol: 5A

291B2—Xenia silt loam, 2 to 5 percent slopes, eroded

Setting

Landform: Till plains

Position on the landform: Convex summits and side slopes

Shape of areas: Irregular or oblong

Size of areas: 3 to 305 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Medium
Available water capacity: High
Seasonal high water table: At a depth of 2.0 to 3.5 feet from December through April
Organic matter content: Moderately low
Hazard of water erosion: Moderate; may be severe, especially on the steeper parts of the slope and where slopes are long
Tilth: Poor; the surface layer tends to crust after hard rains.
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
 0 to 6 inches—brown, friable silt loam; fragments of dark yellowish brown material from the subsoil in the lower part
Subsoil:
 6 to 28 inches—dark yellowish brown and yellowish brown, mottled, firm silty clay loam
 28 to 50 inches—yellowish brown, mottled, firm clay loam
Substratum:
 50 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Xenia and similar soils: 90 to 95 percent
 Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that are well drained
- Soils that have more than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Xenia soil
- The somewhat poorly drained Sabina and Sunbury soils on nearly level summits and shoulders

Use and Management

Cropland

Suitability: Well suited
Major concerns: Water erosion, tilth
Management considerations:

- A crop rotation that includes grasses and legumes and a combination of contour farming, terraces, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.

Pasture and hay

Suitability: Well suited
Major concerns: Water erosion, tilth
Management considerations:

- Establishing bromegrass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Overgrazing reduces forage production, causes surface compaction and excessive runoff, and increases the hazard of water erosion.
- Seeding and renovating on the contour, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition and help to control water erosion.

Woodland

Suitability: Well suited
Major concern: Plant competition
Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife
Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and

untilled throughout the winter improve the habitat.

- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited to use as a site for dwellings without basements, poorly suited to use as a site for dwellings with basements

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table is a limitation on sites for dwellings, especially dwellings with basements. The shrink-swell potential is an additional limitation on sites for dwellings without basements.
- Installing subsurface drains near the foundation helps to remove excess water.
- On sites for dwellings without basements, extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are established help to control water erosion.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Installing interceptor drains higher on the side slopes than the absorption field helps to intercept seepage water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIe

Woodland ordination symbol: 5A

330—Peotone silty clay loam

Setting

Landform: Till plains

Position on the landform: Shallow closed depressions

Slope: 0 to 2 percent

Ponding: Water may be ponded 0.5 foot above the surface for brief periods from February through July and can damage crops in most years.

Shape of areas: Round or oval

Size of areas: 3 to 20 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Very poorly drained

Permeability: Moderately slow

Parent material: Colluvial sediments

Surface runoff: Slow to ponded

Available water capacity: High

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface from February through July

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Fair; the surface layer becomes compacted and cloddy if it is plowed when too wet.

Shrink-swell potential: High

Potential for frost action: High

Typical Profile

Surface layer:

0 to 10 inches—black, firm silty clay loam

Subsurface layer:

10 to 22 inches—black, firm silty clay loam

Subsoil:

22 to 33 inches—very dark gray, firm silty clay

33 to 47 inches—dark grayish brown, mottled, firm silty clay loam

Substratum:

47 to 60 inches—olive gray, mottled, friable silty clay loam

Composition

Peotone and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thinner dark surface layer and subsurface layer
- Soils that contain less clay in the subsoil
- Soils that have carbonates in the subsoil
- Soils that have more sand in the lower part of the subsoil

Contrasting inclusions:

- The somewhat poorly drained Flanagan soils on nearly level summits and shoulders above the Peotone soil

Use and Management

Cropland

Suitability: Well suited if adequately drained

Major concerns: Ponding, wetness, tilth

Management considerations:

- Corn, soybeans, and small grain can be grown in most areas because a drainage system has been installed.
- Wetness delays planting or damages crops in some years. Measures that maintain the present drainage system are needed.
- Tilling when the soil is wet causes surface compaction and cloddiness.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and cloddiness, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited if adequately drained

Major concerns: Ponding, wetness, tilth

Management considerations:

- The seasonal high water table and the ponding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.
- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and the deterioration of tilth.
- Applications of fertilizer, weed control, rotation grazing, proper stocking rates, deferred grazing, restricted use during wet periods, and timely harvesting help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The frequent ponding and the seasonal high water table provide good habitat for mink, frogs, salamanders, ducks, herons, songbirds, and other wetland wildlife.
- Shallow ponds and marshes can be created by blocking natural channels and manmade drainage systems.
- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redtop, and reed canarygrass provide food and cover for wetland wildlife.
- Measures that protect the area from fire and grazing are needed.

Dwellings

Suitability: Generally unsuited because of the shrink-swell potential and the ponding

Septic tank absorption fields

Suitability: Generally unsuited because of the restricted permeability and the ponding

Interpretive Groups

Land capability classification: IIw

348A—Wingate silt loam, 0 to 2 percent slopes**Setting**

Landform: Till plains

Position on the landform: Nearly level summits

Shape of areas: Irregular

Size of areas: 3 to 75 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained

Permeability: Moderately slow

Parent material: Loess and till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 2.5 to 5.0 feet from December through May

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 9 inches—very dark grayish brown, friable silt loam

Subsoil:

9 to 36 inches—dark yellowish brown and yellowish brown, firm silty clay loam that has mottles in the lower part

36 to 47 inches—yellowish brown, mottled, firm clay loam

Substratum:

47 to 60 inches—yellowish brown, mottled, firm, calcareous loam

Composition

Wingate and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that are well drained
- Soils that have more than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow depressions and drainageways
- The somewhat poorly drained Flanagan, Sabina, and Sunbury soils on nearly level summits and shoulders

Use and Management**Cropland***Suitability:* Well suited*Management considerations:*

- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material help to maintain tilth and fertility.

Pasture and hay*Suitability:* Well suited*Management considerations:*

- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Wildlife habitat*Suitability:* Well suited to use as habitat for openland wildlife*Management considerations:*

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings*Suitability:* Moderately suited*Major concerns:* Wetness, shrink-swell potential*Management considerations:*

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a limitation on sites for dwellings without basements.
- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.

Septic tank absorption fields*Suitability:* Poorly suited*Major concerns:* Wetness, permeability*Management considerations:*

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Installing subsurface drains near the perimeter of the absorption field lowers the seasonal high water table.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups*Land capability classification:* I**348B2—Wingate silt loam, 2 to 5 percent slopes, eroded****Setting***Landform:* Till plains*Position on the landform:* Convex summits and side slopes*Shape of areas:* Irregular or oblong*Size of areas:* 3 to 30 acres*Major use:* Cropland**Soil Properties and Qualities***Drainage class:* Moderately well drained*Permeability:* Moderately slow*Parent material:* Loess and till*Surface runoff:* Medium*Available water capacity:* High*Seasonal high water table:* At a depth of 2.5 to 5.0 feet from December through May*Organic matter content:* Moderate*Hazard of water erosion:* Moderate; may be severe, especially on the steeper parts of the slope and where slopes are long*Tilth:* Fair; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 7 inches—very dark grayish brown, friable silt loam; fragments of dark yellowish brown material from the subsoil in the lower part

Subsoil:

7 to 30 inches—dark yellowish brown and yellowish brown, mottled, firm silty clay loam

30 to 42 inches—brown, mottled, firm clay loam

Substratum:

42 to 60 inches—yellowish brown, mottled, firm, calcareous loam

Composition

Wingate and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that are well drained
- Soils that have more than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Wingate soil
- The somewhat poorly drained Flanagan, Sabina, and Sunbury soils on nearly level summits and shoulders

Use and Management

Cropland

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- A crop rotation that includes grasses and legumes and a combination of contour farming, terraces, grassed waterways, no-till planting, or a conservation tillage system that leaves crop residue on the surface after planting minimize surface compaction and crusting, increase the rate of water infiltration, improve tilth and fertility, and help to control water erosion.

Pasture and hay

Suitability: Well suited

Major concerns: Water erosion, tilth

Management considerations:

- Establishing brome grass, orchardgrass, tall fescue, and alfalfa for forage and hay improves tilth and fertility and helps to control water erosion.
- Suitable warm-season grasses include indiangrass, switchgrass, and little bluestem.

- The plants should not be grazed or clipped until they are sufficiently established.
- Overgrazing or grazing when the soil is too wet reduces forage production, causes surface compaction and excessive runoff, and increases the hazard of water erosion.
- Applications of fertilizer, weed control, rotation grazing, proper stocking rates, deferred grazing, restricted use during wet periods, and timely harvesting help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Moderately suited

Major concerns: Wetness, shrink-swell potential

Management considerations:

- The seasonal high water table and the shrink-swell potential are limitations on sites for dwellings with basements. The shrink-swell potential also is a limitation on sites for dwellings without basements.
- On sites for dwellings with basements, installing subsurface drains around the base of the foundation helps to remove excess water.
- Extending the footings below the subsoil or properly designing and reinforcing the foundation helps to prevent the structural damage caused by shrinking and swelling.
- Leaving as much undisturbed vegetation on the surface as possible during construction, seeding or sodding all disturbed areas as soon as possible, and maintaining a cover of mulch until seedlings are

established help to control water erosion.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Installing interceptor drains higher on the side slopes than the absorption field helps to intercept seepage water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIe

353A—Toronto silt loam, 0 to 2 percent slopes

Setting

Landform: Glacial moraines

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 3 to 24 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1 to 3 feet from January through April

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 8 inches—very dark grayish brown, friable silt loam

Subsoil:

8 to 37 inches—yellowish brown and light brownish gray, mottled, firm silty clay loam

37 to 44 inches—light brownish gray, mottled, firm loam

Substratum:

44 to 60 inches—pale brown, mottled, firm, calcareous loam

Composition

Toronto and similar soils: 90 to 98 percent

Contrasting inclusions: 2 to 10 percent

Inclusions

Similar soils:

- Soils that have a light colored surface layer
- Soils that have a thicker dark surface layer
- Soils that have more clay in the subsoil

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Toronto soil
- The moderately well drained Wingate soils on the more sloping summits

Use and Management

Cropland

Suitability: Well suited

Major concern: Wetness

Management considerations:

- The seasonal high water table can delay planting in some years.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize crusting and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concern: Wetness

Management considerations:

- Subsurface tile drains have been installed in most areas and function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Poorly suited

Major concern: Wetness

Management considerations:

- When sites for dwellings are being prepared, grading and land shaping help to remove excess surface water.
- Installing subsurface drains near the foundation helps to remove excess water.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Subsurface drains lower the seasonal high water table.
- Grading and land shaping by cutting and filling help to remove excess surface water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIw

481A—Raub silt loam, 0 to 2 percent slopes**Setting**

Landform: Glacial moraines

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 2 to 70 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1 to 3 feet from January through April

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface soil:

0 to 14 inches—very dark grayish brown, friable silt loam

Subsoil:

14 to 35 inches—dark yellowish brown, mottled, firm silty clay loam

35 to 52 inches—yellowish brown and dark yellowish brown, mottled, firm clay loam and silty clay loam

Substratum:

52 to 60 inches—brown, mottled, firm, calcareous loam

Composition

Raub and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

Inclusions

Similar soils:

- Soils that have a thinner surface layer
- Soils that have more clay in the subsoil
- Soils that have more than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The moderately well drained Dana soils on side slopes and the higher summits
- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Raub soil
- Soils that are more sloping than the Raub soil

Use and Management

Cropland

Suitability: Well suited

Major concern: Wetness

Management considerations:

- The seasonal high water table can delay planting in some years.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize crusting and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concern: Wetness

Management considerations:

- Subsurface tile drains have been installed in most areas and function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiagrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and

untilled throughout the winter improve the habitat.

- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Poorly suited

Major concern: Wetness

Management considerations:

- When sites for dwellings are being prepared, grading and land shaping help to remove excess surface water.
- Installing subsurface drains near the foundation helps to remove excess water.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Subsurface drains lower the seasonal high water table.
- Grading and land shaping by cutting and filling help to remove excess surface water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: IIw

496A—Fincastle silt loam, 0 to 2 percent slopes

Setting

Landform: Glacial moraines

Position on the landform: Nearly level summits and shoulders

Shape of areas: Irregular

Size of areas: 3 to 12 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Parent material: Loess and glacial till

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1 to 3 feet from January through April

Organic matter content: Moderately low

Hazard of water erosion: Slight

Tilth: Fair; the surface layer tends to crust after hard rains.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 8 inches—brown, friable silt loam

Subsurface layer:

8 to 11 inches—grayish brown, mottled, firm silt loam

Subsoil:

11 to 32 inches—yellowish brown, mottled, firm silty clay loam

32 to 40 inches—light brownish gray, mottled, firm clay loam

40 to 50 inches—yellowish brown, mottled, firm loam

Substratum:

50 to 60 inches—yellowish brown, mottled, friable, calcareous loam

Composition

Fincastle and similar soils: 90 to 98 percent

Contrasting inclusions: 2 to 10 percent

Inclusions

Similar soils:

- Soils that have a dark surface layer
- Soils that have more than 40 inches of loess overlying the loamy glacial till

Contrasting inclusions:

- The poorly drained Drummer soils on toe slopes and in shallow drainageways and depressions below the Fincastle soil
- The moderately well drained Xenia soils on side slopes and the higher summits

Use and Management

Cropland

Suitability: Well suited

Major concerns: Wetness, tilth

Management considerations:

- The seasonal high water table can delay planting in some years.
- Surface drains, subsurface tile drains, and surface inlets have been installed in most areas and generally function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and crusting, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Wetness, tilth

Management considerations:

- Subsurface tile drains have been installed in most areas and function satisfactorily if suitable outlets are available.
- Measures that maintain the present drainage system are needed.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and big bluestem.
- The plants should not be grazed or clipped until they are sufficiently established.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Hedges and rows of shrubs provide cover for doves and songbirds.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.

• Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings

Suitability: Poorly suited

Major concern: Wetness

Management considerations:

- When sites for dwellings are being prepared, grading and land shaping help to remove excess surface water.
- Installing subsurface drains near the foundation helps to remove excess water.

Septic tank absorption fields

Suitability: Poorly suited

Major concerns: Wetness, permeability

Management considerations:

- The seasonal high water table and the moderately slow permeability are limitations if this soil is used as a site for septic tank absorption fields.
- Subsurface drains lower the seasonal high water table.
- Grading and land shaping by cutting and filling help to remove excess surface water.
- Enlarging the absorption area or replacing the soil with more permeable material improves the absorption of liquid waste.

Interpretive Groups

Land capability classification: 11w

Woodland ordination symbol: 4A

1402—Colo silty clay loam, wet

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Flooding: Frequently flooded for long periods from February through November

Ponding: Frequently ponded for long periods

Shape of areas: Irregular or oblong

Size of areas: 15 to 585 acres

Major use: Wetland wildlife habitat

Soil Properties and Qualities

Drainage class: Poorly drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow to ponded

Available water capacity: High

Seasonal high water table: 0.5 foot above to 1.0 foot below the surface from November through July

Organic matter content: High

Hazard of water erosion: Slight

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 4 inches—black, firm silty clay loam

Subsurface layer:

4 to 30 inches—very dark gray, firm silty clay loam

Subsoil:

30 to 42 inches—very dark gray, firm silty clay loam

42 to 56 inches—dark gray, mottled, firm silty clay loam

Substratum:

56 to 60 inches—very dark gray, firm silty clay loam

Composition

Colo and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

Inclusions

Similar soils:

- Soils that have a thinner dark surface layer and subsurface layer
- Soils that contain more clay throughout
- Soils that contain more sand throughout

Contrasting inclusions:

- The somewhat poorly drained Lawson and Tice soils in the slightly higher positions on flood plains
- The well drained Huntsville soils in the higher positions on flood plains

Use and Management

Cropland and pasture and hay

Suitability: Generally unsuited because of the flooding and the ponding

Woodland

Suitability: Poorly suited

Major concerns: Flooding, ponding

Management considerations:

- Tree species that are adapted to a high water table and to periods of prolonged flooding should be selected.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- The flooding and the ponding severely limit the use of machinery.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The flooding, the ponding, and the seasonal high water table provide good habitat for mink, frogs,

salamanders, ducks, herons, songbirds, and other wetland wildlife.

- Areas of this soil are adjacent to Lake Shelbyville and are influenced by the fluctuating water levels of the lake.

- Shallow water areas that are near grain and seed crops provide resting and feeding areas for migrating ducks and geese.

- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redtop, and reed canarygrass provide food and cover for wetland wildlife.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: Vw

3074—Radford silt loam, frequently flooded

Setting

Landform: Flood plains

Flooding: Frequently flooded for brief periods from March through June

Shape of areas: Long and narrow

Size of areas: 8 to 48 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1 to 3 feet from March through June

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 7 inches—mixed black and very dark gray, friable silt loam

Subsurface layer:

7 to 13 inches—very dark gray, friable silt loam

Substratum:

13 to 30 inches—stratified very dark gray and dark grayish brown, mottled, friable silt loam

30 to 60 inches—black, mottled, firm silty clay loam

Composition

Radford and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

Inclusions

Similar soils:

- Soils that have a higher content of sand throughout
- Soils that have a light colored overwash layer

Contrasting inclusions:

- The well drained Miami soils on side slopes above the Radford soil

Use and Management

Cropland

Suitability: Moderately suited

Major concerns: Flooding, wetness

Management considerations:

- Wetness and the brief periods of flooding can delay planting or damage crops in some years.
- Measures that maintain the present drainage system are needed.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by excess water.
- Keeping tillage at a minimum and returning crop residue to the soil increase the rate of water infiltration and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Flooding, wetness

Management considerations:

- The seasonal high water table and the brief periods of flooding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indianguass, switchgrass, and big bluestem.

Wildlife habitat

Suitability: Well suited to use as habitat for openland wildlife

Management considerations:

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover,

and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redtop, and bluegrass.

- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: IIIw

3107—Sawmill silty clay loam, frequently flooded

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Flooding: Frequently flooded for brief periods from March through June

Shape of areas: Irregular

Size of areas: 6 to 16 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow

Available water capacity: Very high

Seasonal high water table: At the surface to 2 feet below the surface from March through June

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Fair; the surface layer becomes compacted and cloddy if it is plowed when too wet.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 9 inches—black, friable silty clay loam

Subsurface layer:

9 to 21 inches—black and very dark gray, mottled, firm silty clay loam

Subsoil:

21 to 48 inches—very dark gray, dark gray, and gray, mottled, firm silty clay loam

48 to 60 inches—mottled gray, dark gray, and strong brown, firm clay loam

Composition

Sawmill and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

Inclusions

Similar soils:

- Soils that have a thinner surface layer
- Soils that contain more clay in the subsoil

Contrasting inclusions:

- The somewhat poorly drained Lawson and Tice soils in the slightly higher positions on flood plains

Use and Management

Cropland

Suitability: Moderately suited

Major concerns: Flooding, wetness, tilth

Management considerations:

- Wetness and the brief periods of flooding can delay planting or damage crops in some years.
- Corn, soybeans, and small grain can be grown in most areas because a drainage system has been installed.
- Measures that maintain the present drainage system are needed.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by excess water.
- Tilling when the soil is wet causes surface compaction and cloddiness.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and cloddiness, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Flooding, wetness, tilth

Management considerations:

- The seasonal high water table and the brief periods of flooding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface

compaction and the deterioration of tilth.

- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.

Woodland

Suitability: Moderately suited

Major concerns: Equipment limitation, seedling mortality, windthrow hazard, wetness, plant competition

Management considerations:

- Tree species that are adapted to a high water table and to periods of flooding should be selected.
- Selecting mature nursery stock, eliminating the competing vegetation near the seedlings, planting on ridges, and mulching reduce the seedling mortality rate. Some replanting may be necessary.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- Using harvesting methods that do not leave the remaining trees isolated or widely spaced and removing only high-value trees from a 50-foot-wide strip along the western and southern edges of the woodland reduce the windthrow hazard.
- The use of machinery is restricted to periods when the soil is firm and dry.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The frequent flooding and the seasonal high water table provide good habitat for mink, frogs, salamanders, ducks, herons, songbirds, and other wetland wildlife.
- Shallow water areas near grain and seed crops provide resting and feeding areas for migrating ducks and geese.
- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redtop, and reed canarygrass provide food and cover for wetland wildlife.
- Measures that protect the area from fire and grazing are needed.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: IIIw

Woodland ordination symbol: 5W

3132A—Starks silt loam, 0 to 2 percent slopes, frequently flooded

Setting

Landform: Stream terraces

Position on the landform: Foot slopes

Flooding: Frequently flooded for brief periods from December through March

Shape of areas: Irregular

Size of areas: 3 to 115 acres

Major use: Wildlife habitat

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderate

Parent material: Loess and glacial outwash

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1 to 3 feet from January through April

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 5 inches—very dark gray, friable silt loam

Subsurface layer:

5 to 16 inches—grayish brown and brown, mottled, friable silt loam

Subsoil:

16 to 37 inches—yellowish brown and brown, mottled, firm silty clay loam

37 to 47 inches—grayish brown and yellowish brown, mottled, firm clay loam

Substratum:

47 to 60 inches—brown, mottled, friable loam

Composition

Starks and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thicker dark surface layer

- Soils that have more gravel in the lower part of the subsoil
- Soils that have more sand in the upper part of the subsoil or have less sand in the lower part of the subsoil

Contrasting inclusions:

- The well drained Camden soils on summits and side slopes above the Starks soil
- The wet, poorly drained Colo soils on flood plains below the Starks soil

Use and Management

Cropland

Suitability: Well suited

Major concerns: Flooding, wetness

Management considerations:

- Wetness and the brief periods of flooding can delay planting or damage crops in some years.
- Measures that maintain the present drainage system are needed.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by excess water.
- Keeping tillage at a minimum and returning crop residue to the soil increase the rate of water infiltration and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Flooding, wetness

Management considerations:

- The seasonal high water table and the brief periods of flooding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- Tree species that are adapted to a high water table and to periods of flooding should be selected.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to

prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.

- The use of machinery is restricted to periods when the soil is firm and dry.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The frequent flooding and the seasonal high water table provide good habitat for mink, frogs, salamanders, ducks, herons, songbirds, and other wetland wildlife.
- Areas of this soil are adjacent to Lake Shelbyville (fig. 11) or the Kaskaskia River.
- Shallow water areas near grain and seed crops provide resting and feeding areas for migrating ducks and geese.
- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redtop, and reed canarygrass provide food and cover for wetland wildlife.
- Measures that protect the area from fire and grazing are needed.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: IIw

Woodland ordination symbol: 4A

3284—Tice silty clay loam, frequently flooded

Setting

Landform: Flood plains

Flooding: Frequently flooded for brief periods from January through June

Shape of areas: Long and narrow

Size of areas: 3 to 135 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1.5 to 3.0 feet from March through June

Organic matter content: Moderate

Hazard of water erosion: Slight



Figure 11.—An idle area of Starks silt loam, 0 to 2 percent slopes, frequently flooded, along Lake Shelbyville. This soil provides good habitat for a wide variety of wetland wildlife species.

Tilth: Fair; the surface layer becomes compacted and cloddy if it is plowed when too wet.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 10 inches—very dark gray, firm silty clay loam

Subsurface layer:

10 to 18 inches—very dark grayish brown, mottled, firm silty clay loam

Subsoil:

18 to 56 inches—brown, mottled, firm silty clay loam

Substratum:

56 to 60 inches—grayish brown, mottled, friable silt loam

Composition

Tice and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

Inclusions

Similar soils:

- Soils that have a thicker dark surface layer
- Soils that have more sand in the lower part of the subsoil

Contrasting inclusions:

- The poorly drained Colo soils in the slightly lower positions on flood plains
- The well drained Huntsville soils in the higher positions on flood plains

Use and Management

Cropland

Suitability: Moderately suited

Major concerns: Flooding, wetness, tilth

Management considerations:

- Wetness and the brief periods of flooding can delay planting or damage crops in some years.
- Corn, soybeans, and small grain can be grown in most areas because a drainage system has been installed.
- Measures that maintain the present drainage system are needed.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by excess water.
- Tilling when the soil is wet causes surface compaction and cloddiness.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and cloddiness, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Flooding, wetness, tilth

Management considerations:

- The seasonal high water table and the brief periods of flooding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and the deterioration of tilth.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Canarygrass, alsike clover, and ladino clover are

suitable to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and big bluestem.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- Tree species that are adapted to a high water table and periods of flooding should be selected.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.
- The use of machinery is restricted to periods when the soil is firm and dry.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland and woodland wildlife

Management considerations:

- The existing stands of trees provide good habitat for deer, squirrels, raccoons, songbirds, raptors, and other woodland wildlife. Trees and shrubs can be easily established in cleared areas.
- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: IIIw

Woodland ordination symbol: 5A

3402—Colo silty clay loam, frequently flooded

Setting

Landform: Flood plains

Slope: 0 to 2 percent

Flooding: Frequently flooded for brief periods from February through November

Shape of areas: Long and narrow

Size of areas: 3 to 820 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow

Available water capacity: High

Seasonal high water table: At a depth of 1 to 3 feet from November through July

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Fair; the surface layer becomes compacted and cloddy if it is plowed when too wet.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 8 inches—black, friable silty clay loam

Subsurface layer:

8 to 28 inches—black, friable silty clay loam

Subsoil:

28 to 54 inches—very dark gray and dark grayish brown, mottled, firm silty clay loam

Substratum:

54 to 60 inches—dark grayish brown, mottled, firm silty clay loam

Composition

Colo and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

Inclusions

Similar soils:

- Soils that have a thinner dark surface layer and subsurface layer
- Soils that have less clay in the subsoil
- Soils that have more sand in the subsoil

Contrasting inclusions:

- The somewhat poorly drained Lawson and Tice soils

in the slightly higher positions on flood plains

- The well drained Huntsville soils in the higher positions on flood plains

Use and Management

Cropland

Suitability: Moderately suited

Major concerns: Flooding, wetness, tilth

Management considerations:

- Wetness and the brief periods of flooding can delay planting or damage crops in some years.
- Corn, soybeans, and small grain can be grown in most areas because a drainage system has been installed.
- Measures that maintain the present drainage system are needed.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by excess water.
- Tilling when the soil is wet causes surface compaction and cloddiness.
- Using a conservation tillage system that leaves crop residue on the surface after planting and regularly adding other organic material minimize surface compaction and cloddiness, increase the rate of water infiltration, and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concerns: Flooding, wetness, tilth

Management considerations:

- The seasonal high water table and the brief periods of flooding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction and the deterioration of tilth.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiangrass, switchgrass, and big bluestem.

Wildlife habitat

Suitability: Well suited to use as habitat for wetland wildlife

Management considerations:

- The frequent flooding and the seasonal high water table provide good habitat for mink, frogs, salamanders, ducks, herons, songbirds, and other wetland wildlife.
- Shallow water areas near grain and seed crops

provide resting and feeding areas for migrating ducks and geese.

- Maintaining smartweed, bulrushes, and bur reed and planting wild millet, redtop, and reed canarygrass provide food and cover for wetland wildlife.
- Measures that protect the area from fire and grazing are needed.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: IIIw

3451—Lawson silt loam, frequently flooded

Setting

Landform: Flood plains

Flooding: Frequently flooded for brief periods from March through November

Shape of areas: Long and narrow

Size of areas: 3 to 450 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow

Available water capacity: Very high

Seasonal high water table: At a depth of 1 to 3 feet from November through May

Organic matter content: High

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 8 inches—very dark gray, friable silt loam

Subsurface layer:

8 to 32 inches—very dark gray and very dark grayish brown, friable silt loam

Substratum:

32 to 44 inches—dark grayish brown, mottled, friable silt loam

44 to 60 inches—dark grayish brown, mottled, friable loam

Composition

Lawson and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

Inclusions

Similar soils:

- Soils that have a thinner dark surface layer and subsurface layer
- Soils that have more sand in the subsoil

Contrasting inclusions:

- The well drained Huntsville soils in the higher positions on flood plains
- The poorly drained Colo soils in the slightly lower positions on flood plains

Use and Management

Cropland

Suitability: Moderately suited

Major concerns: Flooding, wetness

Management considerations:

- Wetness and the brief periods of flooding can delay planting or damage crops in some years.
- Measures that maintain the present drainage system are needed.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by excess water.
- Keeping tillage at a minimum and returning crop residue to the soil increase the rate of water infiltration and improve tilth and fertility (fig. 12).

Pasture and hay

Suitability: Well suited

Major concerns: Flooding, wetness

Management considerations:

- The seasonal high water table and the brief periods of flooding restrict the growth of some forage crops and limit the choice of plants and the period of grazing or cutting.
- Measures that maintain the present drainage system are needed.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Canarygrass, alsike clover, and ladino clover are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and big bluestem.

Woodland

Suitability: Moderately suited

Major concerns: Equipment limitation, plant competition

Management considerations:

- Tree species that are adapted to a high water table and periods of flooding should be selected.
- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to



Figure 12.—Keeping tillage to a minimum and returning crop residue to the soil are important management practices in areas of Lawson silt loam, frequently flooded. In the background, pasture and trees help to control water erosion in an area of Miami soils.

prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.

- The use of machinery is restricted to periods when the soil is firm and dry.
- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland and woodland wildlife

Management considerations:

- The existing stands of trees provide good habitat for deer, squirrels, raccoons, songbirds, raptors, and other

woodland wildlife. Trees and shrubs can be easily established in cleared areas.

- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alsike clover, ladino clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include brome grass, timothy, redtop, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and

legumes may be mowed after August 1.

- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the wetness and the flooding

Interpretive Groups

Land capability classification: IIIw

Woodland ordination symbol: 2W

8077—Huntsville silt loam, occasionally flooded

Setting

Landform: Flood plains

Flooding: Occasionally flooded for very brief or brief periods from January through June

Shape of areas: Long and narrow

Size of areas: 3 to 80 acres

Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained

Permeability: Moderate

Parent material: Silty alluvium

Surface runoff: Slow

Available water capacity: Very high

Seasonal high water table: At a depth of more than 6 feet

Organic matter content: Moderate

Hazard of water erosion: Slight

Tilth: Good; the surface layer can be easily tilled throughout a wide range in moisture content.

Shrink-swell potential: Moderate

Potential for frost action: High

Typical Profile

Surface layer:

0 to 9 inches—very dark grayish brown, friable silt loam

Subsurface layer:

9 to 40 inches—black and very dark brown, friable silt loam

Substratum:

40 to 60 inches—brown, friable silt loam

Composition

Huntsville and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Inclusions

Similar soils:

- Soils that have a thinner dark surface layer and subsurface layer
- Soils that have more sand throughout

Contrasting inclusions:

- The somewhat poorly drained Tice and Lawson soils in the slightly lower positions on flood plains
- The poorly drained Colo soils in the lower positions on flood plains

Use and Management

Cropland

Suitability: Well suited

Major concern: Flooding

Management considerations:

- Flooding occurs during the growing season less often than once in 2 years, but it delays planting or damages crops in some years.
- Planting crop varieties that are adapted to a short growing season and wet conditions minimizes crop damage caused by floodwater.
- Keeping tillage at a minimum and returning crop residue to the soil increase the rate of water infiltration and improve tilth and fertility.

Pasture and hay

Suitability: Well suited

Major concern: Flooding

Management considerations:

- The flooding delays the harvesting of hay crops in some years.
- Measures that maintain the present drainage system are needed.
- Seeding of the pasture or hayland, proper stocking rates, rotation grazing, timely deferment of grazing, restricted use during wet periods, and applications of fertilizer help to keep the pasture in good condition.
- Bromegrass, orchardgrass, tall fescue, and alfalfa are suited to this soil. Suitable warm-season grasses include indiagrass, switchgrass, and little bluestem.

Woodland

Suitability: Well suited

Major concern: Plant competition

Management considerations:

- The competition from undesirable plants in openings where timber has been harvested can be controlled by chemical or mechanical means.
- Excluding livestock from the woodland helps to prevent destruction of the leaf mulch and of desirable young trees, compaction of the soil, and damage to tree roots.

- Protecting the stands from uncontrolled fire minimizes injury to trees and maintains the leaf mulch.

Wildlife habitat

Suitability: Well suited to use as habitat for openland and woodland wildlife

Management considerations:

- The existing stands of trees provide good habitat for deer, squirrels, raccoons, songbirds, raptors, and other woodland wildlife. Trees and shrubs can be easily established in cleared areas.
- Growing grain, seed crops, grasses, and legumes along with wild herbaceous plants provides food and cover for openland wildlife, such as pheasants, songbirds, marsh hawks, red fox, and rabbits.
- Suitable legumes include alfalfa, alsike clover, and red clover. Suitable warm-season grasses include big bluestem, little bluestem, indiangrass, and switchgrass. Suitable cool-season grasses include bromegrass, timothy, redbud, and bluegrass.
- Nesting cover should be protected from fire, traffic, grazing, mowing, or other disturbances until August 1. Nesting cover composed of cool-season grasses and legumes may be mowed after August 1.
- Leaving unharvested areas next to areas of wildlife cover and leaving harvested areas ungrazed and untilled throughout the winter improve the habitat.
- Existing areas of grassy or herbaceous cover should be retained wherever possible, especially where they occur as strips, such as roadsides, fence rows, hedgerows, windbreaks, and field lanes.

Dwellings and septic tank absorption fields

Suitability: Generally unsuited because of the flooding

Interpretive Groups

Land capability classification: IIw

Woodland ordination symbol: 7A

Prime Farmland

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

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

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

About 191,000 acres in the survey area, or nearly 87 percent of the total acreage, meets the soil requirements for prime farmland. This land generally is used for cultivated crops, mainly corn and soybeans. The prime farmland is scattered throughout the county, but the most extensive areas are in associations 1, 2, and 4, which are described under the heading "General Soil Map Units."

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

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures. In Moultrie County, most of the naturally wet soils have been adequately drained.

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 to prevent 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 behavioral 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 recreational 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 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

Bob Harris, Moultrie County extension advisor, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants

best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources 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 the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1987, approximately 180,910 acres in Moultrie County, or about 82 percent of the total acreage, was cropland or pasture. Of this acreage, about 156,910 acres was used for corn and soybeans, 14,770 acres for wheat and oats, and 9,230 acres for pasture and hay (U.S. Department of Commerce, 1987).

The potential of the soils in Moultrie County for increased food production is fair or poor. Most of the land that is not used for cultivated crops is highly susceptible to water erosion or is subject to flooding or ponding. Food production could be increased by extending the latest crop production technology to all of the cropland in the county. This soil survey can greatly facilitate the application of such technology.

Water erosion is a major hazard on about 20 percent of the cropland and pasture in the county. It is a hazard in areas where slopes are more than 2 percent or in areas where slopes are longer or are subject to concentrated flow. Dana, Miami, Parr, and Xenia soils are subject to water erosion.

Loss of the surface layer through water erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. The surface layer contains most of the chemically active organic matter in the soil. Loss of the surface layer is especially damaging in soils where part or all of the subsoil formed in glacial till, such as Dana, Miami, and Parr soils. Second, erosion results in the sedimentation of streams and lakes. Control of water erosion minimizes this

pollution and improves the quality of water available for municipal and recreational uses and for fish and wildlife.

Measures that control erosion provide a protective surface cover, increase the rate of water infiltration, and thus help to control surface runoff. A cropping system that keeps a plant cover on the soils for extended periods reduces the hazard of water erosion and preserves the productive capacity of the soils. On livestock farms, which require pasture and hay, including grasses and legumes in the crop rotation helps to control water erosion in sloping areas, provides nitrogen to the crop, and improves tilth for the following crop.

A conservation tillage system that leaves crop residue on the surface after planting is very effective in controlling water erosion. This tillage method creates a rough surface that is partially covered with crop residue. The residue protects the surface from the beating action of raindrops, minimizes surface crusting, and provides a friable seedbed for good seed germination. As tilth improves, the rate of water infiltration is increased and the runoff rate and the hazard of water erosion are reduced.

A system of conservation tillage that is commonly used in Moultrie County is chisel tillage. Where this system is applied, crop residue covers 20 to 60 percent of the surface, depending on the type of chisel plow used, the speed of the plow, and the type of crop residue. Chiseling often follows stalk chopping in the fall, but it can be used immediately prior to planting in the spring.

Another conservation tillage system used in the county is no-till farming. Where this system is applied, a grain crop, generally corn, is planted directly in an existing cover crop, sod, or crop residue. A special planter is used. Herbicides are used to control competing vegetation. This system helps to control water erosion because it maintains a nearly complete ground cover. The only area that is disturbed is the area of the seed row. Thus, the soil is held in place and is not affected by the beating action of raindrops or by water flowing over the surface.

Ridge-till is a system of conservation tillage that is used in a few areas of the county. Where this system is applied, the crop is planted on ridges 6 to 10 inches high. The ridges were created by a special tillage tool during the previous cropping year. They dry faster in spring and allow for more rapid seed germination than is typical in areas where conventional tillage methods are applied. If constructed on the contour, the ridges obstruct waterflow and thus help to prevent excessive runoff and water erosion.

Terraces and contour farming also are effective in controlling water erosion. The terraces used in Moultrie

County are generally parallel tile outlet terraces. These terraces allow for the use of equipment with various row widths and eliminate bothersome point rows. Terraces help to control water erosion by shortening the length of slopes. Water collects behind the terraces and is disposed of through underground tile at a controlled rate. Contour farming helps to control water erosion by creating small ridges that are perpendicular to the slope of the land, thereby greatly reducing the amount and velocity of the water moving down the slope. Dana, Wingate, and Xenia soils are well suited to terraces and contour farming.

Erosion-control measures are effective alone or in combination on most of the farmland in Moultrie County. The combination used and its effectiveness depend on soil characteristics and topography. Information about the design and applicability of erosion-control measures is available in the local office of the Natural Resources Conservation Service.

Soil blowing is a hazard on soils that have a surface layer of silt loam or coarser textured material. Soil blowing can occur on these soils in winter and spring, when the soil surface is dry and the surface is bare. Mulching, maintaining a good plant cover, or applying tillage methods that keep the surface rough minimizes the hazard of soil blowing. Field windbreaks also help to control soil blowing.

Soil tilth is a management concern on many of the soils in the county. It affects seed germination and the infiltration of water. About 15 percent of the soils in Moultrie County have a surface layer that has a low or moderately low content of organic matter. Generally, the structure of such soils is weakened by tillage. After periods of heavy rainfall, a crust forms on the surface of these soils. The crust is hard when dry and is nearly impervious to water. Thus, it reduces the rate of water infiltration and increases the runoff rate and the hazard of water erosion. The crust can even be hard enough to inhibit the germination and proper growth of seedlings. Such a crust is likely to form on Camden, Miami, Sabina, and Xenia soils. Regular additions of crop residue, manure, and other organic material improve soil structure and minimize crusting. A conservation tillage system that leaves crop residue on the surface after planting also helps to prevent the formation of a crust.

Deterioration of tilth also can be a problem on the poorly drained or very poorly drained, dark Colo, Drummer, Hartsburg, Peotone, and Sawmill soils. These soils have a surface layer of silty clay loam. They stay wet until late in spring. If they are tilled when wet, they tend to be very cloddy when dry. Because of the cloddiness, preparing a good seedbed is difficult.

In some sloping areas, poor tilth is a management



Figure 13.—Drainage ditches provide outlets for subsurface drainage systems and effectively remove excess water in areas of poorly drained and somewhat poorly drained soils.

concern. It results from the loss of the original friable surface layer. Preparing a good seedbed and tilling are difficult because the present plow layer is partly or mostly subsoil material that has a higher content of clay than the original surface layer. These areas tend to be cloddy when tilled and slippery when wet. They are on convex summits and side slopes throughout the county.

Poor tilth is also a problem on soils that have a plowpan in the lower part of the surface layer. This pan can form in soils that have a surface layer of silt loam or silty clay loam. It reduces the rate at which water moves downward through the soil. Because of the impeded drainage, the runoff rate and the hazard of

water erosion can be increased in sloping areas and the soils stay wetter longer in spring.

Wetness is a management concern on about 70 percent of the acreage used for crops and pasture in the county. In most areas, drainage systems have been installed (fig. 13). Measures that maintain the present drainage system are needed (Drablos and Moe, 1984).

Some soils, classified as hydric soils, are naturally so wet that the production of crops generally is not possible unless a drainage system is installed. A hydric soil is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. These hydric soils usually support hydrophytic vegetation under natural (unaltered)

conditions. Hydric soils in Moultrie County include the poorly drained or very poorly drained Colo, Drummer, Hartsburg, Peotone, and Sawmill soils. Most of these soils have been drained and are used for crop production. Small areas of hydric soils may occur as inclusions in map units that are not listed as hydric soils. Where they are used, special spot symbols for depressions, wet spots, and small areas of Peotone soils may indicate a hydric soil inclusion in the map unit. In some cases, onsite evaluation is needed to make a hydric soil determination. Information about hydric soils is available in the local office of the Natural Resources Conservation Service.

Unless drained, the somewhat poorly drained soils are generally wet enough for planting to be delayed in some years. Fincastle, Flanagan, Lawson, Radford, Raub, Sabina, Starks, Sunbury, Tice, and Toronto soils are examples of somewhat poorly drained soils.

Drainage is a major consideration in managing crops and pasture. Management of drainage in conformance with regulations influencing wetlands may require special permits and extra planning. Information about drainage systems is available in local offices of the Natural Resources Conservation Service and the Cooperative Extension Service.

Flooding by stream overflow is a hazard on Colo, Lawson, Radford, Sawmill, Starks, and Tice soils. Generally, these soils are flooded during the growing season more frequently than once every 2 years. Levees help to protect the soils. Planting crops that are adapted to a shorter growing season and wetter conditions reduces the extent of crop damage caused by floodwater.

Soil fertility varies in the soils in Moultrie County. The light colored soils on till plains, such as Fincastle, Sabina, and Xenia soils, are more acid in the subsoil and less fertile than the dark Dana, Drummer, and Flanagan soils. The soils on flood plains, such as Colo, Lawson, and Tice soils, are neutral or slightly alkaline throughout and are naturally high in content of plant nutrients. Miami, Parr, and other moderately eroded or severely eroded soils, which have lost most or all of their nutrient-rich topsoil, are less fertile than uneroded or slightly eroded soils.

Most of the light colored soils on till plains are naturally acid. Periodic applications of lime are needed to maintain high yields on these soils. They are also needed on dark soils that have become acid because of farming and the application of certain fertilizers.

The level of natural phosphorus in the soils on uplands is medium (Anderson and others, 1991-1992). The ability of the soils to supply phosphorus to the crop varies, depending on the natural drainage class. The better drained soils have a higher level of available

phosphorus in the subsoil and substratum than the more poorly drained soils. The potassium level in the soils in Moultrie County is generally high (Anderson and others, 1991-1992). The content of available potassium depends on individual soil characteristics. On all soils, the amount of lime and fertilizer to be applied should be based on the results of soil tests, on the needs of the crop, and on the desired level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to be applied.

The field crops suited to the soils and climate of the survey area include many that are not commonly grown. Corn and soybeans are the major row crops. Winter wheat and oats are the most common close-growing crops. Forage crops include smooth brome grass, orchardgrass, Kentucky bluegrass, alfalfa, and red clover.

Most of the well drained and moderately well drained soils in the county are suitable for vegetables and nursery plants. Soils in low areas, where frost is frequent and air drainage is poor, generally are poorly suited to early vegetables and small fruits.

In the section "Detailed Soil Map Units," the suitability of the soils for cultivated crops and pasture is indicated. Soils that are described as well suited to corn, soybeans, and small grain are in land capability classes I and II; those that are moderately suited are in class III; those that are poorly suited are in class IV; and those that are unsuited are in classes V, VI, and VII.

The soils that are well suited to pasture and hay have animal unit month ratings (AUM) of more than 7. An animal unit month is the amount of forage needed to maintain one cow, one horse, one mule, five sheep, or five goats for 30 days. A rating of more than 7 indicates that the soil can meet the requirements for more than 7 such animal units. Generally, these soils are well drained to poorly drained and are not persistently wet. They have enough available water to support the forage crop throughout the summer. Slopes vary but generally range from 0 to 10 percent.

Soils that are moderately well suited to pasture and hay have AUM ratings of 3 to 7. These soils are in nearly level areas that are so persistently wet that forage production is inhibited, or they are in areas where the slope is a management concern.

Soils that are poorly suited to pasture and hay have AUM ratings of less than 3. These soils tend to be quite steep and have a restricted available water capacity during the summer. Also, seeding, harvesting, and maintaining forage crops are difficult because of the slope.

Yields per Acre

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

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents (Fehrenbacher and others, 1978). Available yield data from nearby counties and results of field trials and demonstrations are also considered.

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

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

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

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA, 1961). Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

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

Woodland Management and Productivity

Dale Donahoo, district forester, U.S. Forest Service, helped prepare this section.

At the time of early settlement, deciduous hardwood forests covered about 51,400 acres, or about 23 percent of the survey area. In 1987, about 12,700 acres, or 6 percent of the county, was wooded (Hahn, 1987). The largest areas of woodland are in associations 3 and 4, which are described under the heading "General Soil Map Units." Since early settlement, much of the original woodland has been cleared for the production of row crops. Much of the remaining woodland is in areas that are too steep, too wet, or too isolated for cultivation. If proper management is applied, the soils in these remaining woodland areas are generally suited to the production of high-quality trees.

Many of the steeper areas are subject to severe water erosion after they are cleared. The timber canopy and the accumulation of leaf litter on the surface provide very effective protection from the erosion caused by the impact of raindrops and by water flowing over the surface. Once this cover is removed, extensive water erosion is possible. In some of the strongly sloping areas that have been cleared for farming, water erosion is a severe hazard. As a result, these areas are better suited to timber than to row crops.

Harvesting on private land generally occurs on steep or very steep soils, such as Miami soils, or in areas of wet soils on flood plains, such as Lawson and Tice soils. Selective cutting of white oak, hickory, ash, and walnut for sawlogs is the most common harvesting practice. Some softwood trees are harvested for pulpwood. In the past, much of the harvested timber was used for veneer, cooperage, railroad ties, or mine props. Because of the decreased demand for these products during the last several decades, however, harvested timber now is used mainly for structural lumber, veneer, or firewood.

The most common trees in the uplands are white oak, black oak, northern red oak, shagbark hickory, white ash, green ash, sugar maple, silver maple, boxelder, black walnut, black cherry, and American elm. The most common trees on flood plains are cottonwood, sycamore, willow, bur oak, pin oak, swamp white oak, hackberry, and silver maple.

The county has approximately 5,360 acres of federally owned forest bordering Lake Shelbyville (fig. 14). This land is managed by the U.S. Army Corps of Engineers. Most of the land is used for recreation, wildlife habitat, or preservation. The State of Illinois manages 7,126 acres in the West Okaw Wildlife Area and the Shelbyville Management Area. Much of this

acreage is wooded. Most of the private woodland areas in the county are along the drainageways of the Kaskaskia and West Okaw Rivers.

The productivity of many of the existing timber stands can be substantially improved through proper woodland management. Good management practices include thinning out mature trees and trees of low value, protecting the woodland from uncontrolled fire and from grazing by livestock, and using the proper harvesting systems.

Logging trails and access roads commonly are in steep areas. Because of the hazard of water erosion, these areas should be shaped, seeded, and fertilized immediately after harvest. Properly shaped and constructed water bars across logging trails also are needed to control water erosion. Interplanting is needed for maximum woodland production. Control of competing vegetation is needed if seedlings are planted. A cover of grasses between rows of seedlings is necessary if the seedlings are planted in bare, sloping areas.

Additional information on planning for woodland management and production can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

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

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

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

Erosion hazard is the probability that damage will



Figure 14.—Tall grasses and trees along Lake Shelbyville, in an area of Miami loam, 18 to 35 percent slopes.

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

special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and season of

use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

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

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

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to

prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years—50 years in this survey area. 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.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

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

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

Windbreaks and Environmental Plantings

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

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field (fig. 15). The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow evenly distributed in the fields, and provide food and cover for wildlife.

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

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



Figure 15.—A windbreak in an area of Dana and Flanagan soils provides wildlife habitat and reduces the hazard of soil blowing.

Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The demand for recreational facilities is increasing throughout Moultrie County. The creation of Lake Shelbyville has greatly enhanced the recreational opportunities in the area (fig. 16). Other small areas throughout the county offer playgrounds, athletic fields, golf courses, fishing ponds, camping and picnic areas, hunting areas, and facilities for target shooting.

The potential for further recreational development is

favorable throughout the county. The soils having the best potential for such development are in the uplands along the Kaskaskia and West Okaw Rivers and near Lake Shelbyville. These soils are in areas where the hilly terrain, wooded slopes, and numerous streams provide a variety of locations suited to recreational uses.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in



Figure 16.—Lake Shelbyville, shared by Moultrie and Shelby Counties, provides a multitude of recreational opportunities.

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 sewer lines. 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 recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning,

design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few



Figure 17.—A blanket of snow covers a picnic and camping area along Lake Shelbyville.

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 (fig. 17) 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 and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways (fig. 18) 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.



Figure 18.—A golf course in an area of Miami and Xenia soils. These soils are well suited to golf fairways.

Wildlife Habitat

Keith A. Whitaker, Moultrie County soil scientist, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and

other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. 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 flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of introduced grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, brome grass, 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 flooding. Soil temperature and soil moisture are also considerations. Because they have been in the area for such a long time, native plants are well adapted to a wide range of soil types. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama. Some weedy plants, most of which have been introduced, compete with nonweedy native vegetation in some areas of the same soils. Native grasses and forbs provide excellent habitat for a variety of wildlife. The extent of wildlife species that depend on grassland habitat has declined in Moultrie County as the native prairie vegetation has vanished and as the "artificial prairies" associated with livestock management have also declined.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. 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 native and

introduced herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, 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 wetness, 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 can also be described as grassland habitat or "edge" habitat (the edge between openland and woodland). Prairie areas, railroad right-of-ways, cropland edges, pasture, meadows, abandoned pastures, field border strips, and properly managed roadsides all provide this type of habitat. Planting grasses and legumes along field borders and roads and leaving these areas unmowed until after August 1, when nesting is complete, provide excellent nesting and rearing cover for wildlife. Shrub borders, properly spaced food and cover plots, and well constructed brush piles along field edges also improve openland habitat. Wildlife attracted to these areas include bobwhite quail, ring-necked pheasant, cottontail rabbit, bobolink, cardinal, upland sandpiper, horned lark, kingbird, mockingbird, bluebird (with nest boxes), raccoon, coyote, fox squirrel, and red fox.

Habitat for woodland wildlife consists of areas of existing deciduous plants or plantings of native deciduous trees and associated grasses, legumes, and wild herbaceous plants. Leaving some dead trees standing provides important nesting places for some species, such as wood ducks and woodpeckers. Wildlife attracted to the wooded areas in Moultrie County include white-tailed deer, wood thrush, chickadee, scarlet tanager, pileated woodpecker, gray squirrel, woodcock, raccoon, wild turkey, and many species of colorful warblers. Wood ducks, hooded mergansers, and belted kingfishers also nest along wooded streams and rivers.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Seasonally flooded farmed wetlands are also important spring and fall feeding areas for migrating ducks, geese, and shore birds. Some of the wildlife attracted to such areas are ducks, geese, egrets, herons, plovers, sandpipers, rails, marsh wrens, muskrat, mink, and beaver.

The soils in Moultrie County provide valuable habitat

for a variety of wildlife species, including bobwhite quail, ring-necked pheasant, mourning dove, white-tailed deer, squirrels, cottontail rabbit, beaver, muskrat, raccoon, mink, opossum, red fox, and many important nongame species. Ducks, geese, and other waterfowl inhabit the flood plains along the Kaskaskia River and its tributaries. Streams and lakes support such fish as smallmouth bass, largemouth bass, white bass, bluegill, crappie, carp, walleye, channel catfish, black bullhead, and sunfish. Many farm ponds are stocked with largemouth bass, channel catfish, and bluegill.

Areas used as wildlife habitat are not necessarily set aside for this purpose. Wildlife habitat is commonly a secondary use in areas used for other purposes, such as farming. For example, the large areas of nearly level and gently sloping soils used for cultivated crops and pasture are also well suited to use as habitat for openland wildlife. Most areas in the county can be improved for wildlife habitat by providing needed food, cover, and water.

The soil associations in the survey area, which are described under the heading "General Soil Map Units," can be grouped into three wildlife areas. These areas are described in the following paragraphs.

Wildlife area 1 consists of the Drummer-Flanagan association. The soils in this wildlife area are on broad glacial till plains. These upland soils are nearly level and are poorly drained and somewhat poorly drained. Except for some of the minor soils, the soils in this association have a seasonal high water table in the spring. In addition, the poorly drained and very poorly drained soils are subject to ponding.

This wildlife area is mainly cropland, much of which is used for corn and soybeans year after year, although small areas are pastured or used for oats and hay. Wildlife habitat is generally of poor quality because of a scarcity of crop residue, herbaceous nesting and roosting cover, woody cover, and travel lanes or hedgerows.

The poorly drained soils in this wildlife area are well suited to habitat for wetland wildlife, such as ducks, geese, mink, muskrat, frogs, turtles, salamanders, herons, woodcock, shore birds, and songbirds. A large percentage of this area is subject to ponding and subsequent crop damage, although nearly all of the area has been artificially drained. The manmade drainage ditches provide some benefit for wetland wildlife by maintaining a perennial watercourse. Delaying or limiting the cultivation and planting of commodity crops in the shallow depressions that are subject to ponding encourages the use of wetlands by wildlife. Growing smartweed, bulrushes, bur reed, and barnyard grass and planting Japanese millet, milo, and

short corn varieties provide food and cover. Shallow ponds and marshes can be created by blocking natural channels and manmade drainage systems.

This wildlife area is also well suited to habitat for openland wildlife. The areas along field borders, roads, and drainageways, the meadows, and the pastured areas provide habitat for cottontail rabbit, red fox, ring-necked pheasant, woodcock, owls, meadowlark, mourning dove, and many types of songbirds. Measures that improve the habitat for openland wildlife include delaying mowing of grassy cover on roadsides, ditchbanks, and waterways until after August 1; seeding roadsides, fence rows, wildlife travel lanes, and land that has been set aside as part of government commodity programs to perennial plants, such as smooth brome grass, timothy, redtop, alfalfa, or alsike clover; enhancing grassy areas with perennial native prairie grasses, such as bluestem, switchgrass, and indiagrass; protecting the existing woody cover from fire and grazing; establishing hedgerows and windbreaks with trees and shrubs that provide a source of food and roosting areas; building brush piles for cover along fence rows and in oddly shaped areas that are inconvenient for cultivation; and using a system of conservation tillage that provides crop residue and waste grain for wildlife cover and food throughout the winter.

Wildlife area 2 consists of the Dana-Parr and Xenia-Miami associations. These upland soils are nearly level to very steep and are moderately well drained and well drained. This area generally borders the major streams in the county and is much more diversified than wildlife area 1. It consists of cropland, pasture, woodland, and streams and ponds and thus provides favorable habitat for a variety of wildlife. The West Okaw Wildlife Area and the Shelbyville Management Area, which are managed by the State of Illinois Department of Conservation, are in wildlife area 2.

Major game species attracted to this area include ring-necked pheasant, white-tailed deer, mourning dove, bobwhite quail, red fox, squirrels, raccoon, and cottontail rabbit. Nongame species include those inhabiting brushy cover and woodlands in addition to those listed in wildlife area 1. Applying good pasture management, protecting the woodlands from livestock grazing, managing crop residue, delaying mowing of grassy cover, and establishing field and farmstead windbreaks, hedgerows, brushy fence rows, and wildlife food plots can improve the habitat.

Wildlife area 3 consists of the Colo-Lawson association. These nearly level soils are poorly drained and somewhat poorly drained. They are on flood plains along the major streams and their tributaries. Most areas are subject to flooding, but a few areas are

protected by levees. This wildlife area is used primarily as cropland or woodland. Areas of wet Colo soils near Lake Shelbyville are left unplanted in most years.

The wildlife in this area includes a variety of wetland, woodland, and openland species. Examples are white-tailed deer, squirrels, cottontail rabbit, raccoon, mink, beaver, muskrat, ducks, geese, and various nongame species. The wet Colo soils provide excellent wetland habitat for ducks, geese, herons, shore birds, muskrat, mink, and beaver. Wetland wildlife habitat can be improved by establishing or preserving areas of open water; by increasing the capacity of ditches, pits, dikes, and levees for retaining water; and by planting millet, buckwheat, sorghum, corn, and other crops that provide food for waterfowl.

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. Ratings are given for 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 should 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, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and

the kinds 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 evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to dense glacial till, by soil texture, and by 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



Figure 19.—Construction of a house in an area of Flanagan silt loam, 0 to 2 percent slopes. Properly designing and reinforcing the footings and installing a subsurface drainage system around the foundation help to overcome a high shrink-swell potential and the seasonal high water table.

the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings (fig. 19) 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, and shrinking and swelling can cause the movement of footings. A high water table, depth to dense glacial till, slope, and

flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 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 dense glacial till, a high water table, flooding, 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 dense glacial till, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfill. 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.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect

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

Although general suggestions for the design of septic tank absorption fields are given for each map unit in the section "Detailed Soil Map Units," local and state ordinances may restrict the installation of septic tank absorption fields in areas of some soils. Specific design criteria required by local and state codes and ordinances should be determined before any such systems are installed.

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

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to dense glacial till, flooding, and content of organic matter.

Excessive seepage resulting from rapid permeability in 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 and zones of dense glacial till can cause construction problems.

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 should be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to dense glacial till, a high water table, slope, and flooding affect both types of landfill. Texture and soil reaction affect trench 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 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 dense glacial till or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index

properties provides detailed information about each soil layer. This information can help to 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 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, a 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 a 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 have a water table at a depth of 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. They are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

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

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40

inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

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

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

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

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

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, 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 organic matter. 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 dense glacial till 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; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to dense glacial till, slope, and the hazard of cutbanks caving. 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 the depth to dense glacial till. The performance of a system is affected by the depth of the root zone and by soil reaction.

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Wetness, slope, and depth to dense glacial till affect the

construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 19.

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 to characterize key soils.

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

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters

in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 19.

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 generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $\frac{1}{3}$ -bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates

the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

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 classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6

percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less

than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

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 little or no horizon development.

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 estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 19 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the Illinois Department of Transportation.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified

classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1975). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven 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 horization, plus *quolls*, the suborder of the Mollisols that has 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. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Haplaquolls.

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. 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" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1975). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Camden Series

Drainage class: Well drained

Permeability: Moderate

Landform: Stream terraces

Parent material: Loess and glacial outwash
Slope range: 0 to 5 percent
Taxonomic class: Fine-silty, mixed, mesic Typic
 Hapludalfs

Typical Pedon

Camden silt loam, 0 to 2 percent slopes, in a cultivated field about 2 miles west of Allenville (map sheet 43); approximately 1,440 feet east and 2,530 feet north of the southwest corner of sec. 19, T. 13 N., R. 6 E.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many very fine and common fine roots; neutral; abrupt smooth boundary.

E—9 to 12 inches; dark yellowish brown (10YR 4/4) silt loam, very pale brown (10YR 7/4) dry; weak thin platy structure; friable; few very fine and fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Bt1—12 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Bt2—17 to 26 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; few very fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt3—26 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; strongly acid; clear smooth boundary.

2Bt4—33 to 38 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; friable; few very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; strongly acid; clear smooth boundary.

2Bt5—38 to 48 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; friable; few distinct brown (10YR 4/3) clay films on faces of peds; strongly acid; clear smooth boundary.

3Bt6—48 to 60 inches; brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; firm; common distinct brown (7.5YR 4/3) clay films

on sand and gravel; about 10 percent pebbles; strongly acid.

Range in Characteristics

Thickness of the loess: 24 to 40 inches

Other features: Some pedons have a 2C horizon.

Ap horizon:

Hue—10YR

Value—4 or 5

Chroma—3

Texture—silt loam

E horizon:

Hue—10YR

Value—4 or 5

Chroma—3 or 4

Texture—silt loam

Bt horizon:

Hue—7.5YR or 10YR

Value—4 or 5

Chroma—4 to 6

Texture—silt loam or silty clay loam

2Bt and 3Bt horizons:

Hue—7.5YR or 10YR

Value—4 or 5

Chroma—4 to 6

Texture—sandy loam, loam, silt loam, sandy clay loam, or clay loam

Colo Series

Drainage class: Poorly drained

Permeability: Moderate

Landform: Flood plains

Parent material: Silty alluvium

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic
 Haplaquolls

Typical Pedon

Colo silty clay loam, frequently flooded, in a cultivated field about 1.5 miles southwest of Lovington (map sheet 18); approximately 360 feet west and 102 feet north of the southeast corner of sec. 32, T. 15 N., R. 5 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

A1—8 to 13 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; common very fine roots; neutral; gradual smooth boundary.

A2—13 to 28 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine

subangular blocky structure; friable; common very fine roots; neutral; gradual smooth boundary.

Bg1—28 to 36 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; few fine prominent dark yellowish brown (10YR 4/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.

Bg2—36 to 47 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; few fine prominent dark yellowish brown (10YR 4/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.

BCg—47 to 54 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine prominent yellowish brown (10YR 5/8) and few fine distinct dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.

Cg—54 to 60 inches; dark grayish brown (10YR 4/2) silty clay loam; common medium faint gray (10YR 5/1) and common coarse prominent yellowish brown (10YR 5/8) mottles; massive; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 36 inches or more

Ap and A horizons:

Hue—10YR or neutral

Value— 2 or 3

Chroma—0 or 1

Texture—silty clay loam

Bg horizon:

Hue—10YR

Value—2 or 3

Chroma—1

Texture—silty clay loam

BCg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—3 to 5

Chroma—1 or 2

Texture—silty clay loam

Cg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—3 to 6

Chroma—1 or 2

Texture—silt loam, silty clay loam, or clay loam; stratified in some pedons

Dana Series

Drainage class: Moderately well drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Loess and glacial till

Slope range: 0 to 5 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct features: The Dana soil in map unit 56B2 has a thinner dark surface layer than is defined as the range for the series. This soil is classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Dana silt loam, 0 to 2 percent slopes, in a cultivated field about 2 miles northeast of Sullivan (map sheet 29); approximately 960 feet east and 295 feet south of the northwest corner of sec. 30, T. 14 N., R. 5 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; many very fine roots; neutral; clear smooth boundary.

Bt1—12 to 16 inches; brown (10YR 4/3) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of ped; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Bt2—16 to 27 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; common very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of ped; few fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt3—27 to 39 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct yellowish brown (10YR 5/6) and few medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of ped; common fine rounded soft

masses of iron and manganese oxide; neutral; clear smooth boundary.

2Bt4—39 to 49 inches; yellowish brown (10YR 5/4) clay loam; common medium distinct yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; firm; few very fine roots; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; neutral; gradual smooth boundary.

2BCt—49 to 60 inches; brown (10YR 5/3) loam; common fine faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium angular blocky structure; firm; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; about 4 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 to 60 inches

Thickness of the loess: 22 to 40 inches

Thickness of the mollic epipedon: 10 to 18 inches

Ap and A horizons:

Hue—10YR

Value—2 or 3

Chroma—1 or 2

Texture—silt loam

Bt horizon:

Hue—10YR

Value—4 or 5

Chroma—3 or 4

Texture—silty clay loam

2Bt horizon:

Hue—10YR

Value—4 or 5

Chroma—3 or 4

Texture—clay loam

2BCt horizon and 2C horizon (if it occurs):

Hue—10YR

Value—4 or 5

Chroma—3 or 4

Texture—loam

Drummer Series

Drainage class: Poorly drained

Permeability: Moderate

Landform: Till plains

Parent material: Loess and glacial outwash

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Haplaquolls

Typical Pedon

Drummer silty clay loam, in a cultivated field about 4 miles northwest of Arthur (map sheet 9); approximately 2,160 feet east and 105 feet south of the northwest corner of sec. 9, T. 15 N., R. 5 E.

Ap—0 to 8 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine granular structure; firm; common very fine roots; slightly acid; clear smooth boundary.

A—8 to 12 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; firm; common very fine roots; neutral; clear smooth boundary.

Btg1—12 to 23 inches; dark gray (10YR 4/1) silty clay loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; few distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Btg2—23 to 32 inches; dark gray (5Y 4/1) silty clay loam; common fine prominent light olive brown (2.5Y 5/4) and few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct very dark grayish brown (2.5Y 3/2) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Btg3—32 to 42 inches; olive gray (5Y 5/2) silty clay loam; many fine prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to weak medium angular blocky; firm; few very fine roots; few distinct very dark grayish brown (2.5Y 3/2) clay films in root channels; common black (10YR 2/1) krotovinas; common fine irregular soft masses of iron and manganese oxide; neutral; clear smooth boundary.

2BCg—42 to 49 inches; gray (5Y 6/1) silt loam; common fine prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure; friable; common black (10YR 2/1) krotovinas; few fine irregular soft masses of iron and manganese oxide; about 3 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

2C—49 to 70 inches; variegated light brownish gray (2.5Y 6/2), brown (10YR 5/3), and yellowish brown (10YR 5/6), stratified silt loam, loam, sandy loam, silty clay loam, and clay loam; massive; friable;

about 5 percent pebbles; strongly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 inches or more

Thickness of the loess: 40 to 60 inches

Thickness of the mollic epipedon: 12 to 24 inches

Ap and A horizons:

Hue—10YR

Value—2 or 3

Chroma—1 or 2

Texture—silty clay loam

Btg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—4 or 5

Chroma—1 or 2

Texture—silt loam or silty clay loam

2BCg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 or 2

Texture—silt loam, loam, or clay loam

2C or 2Cg horizon (if it occurs):

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 to 6

Texture—stratified loamy sand to silty clay loam

Fincastle Series

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Glacial moraines

Parent material: Loess and glacial till

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aeric

Ochraqualfs

Typical Pedon

Fincastle silt loam, 0 to 2 percent slopes, approximately 100 feet south and 1,800 feet west of the northeast corner of sec. 29, T. 14 N., R. 10 E., in Coles County:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

E—8 to 11 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; few fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few fine rounded soft masses of iron and manganese oxide; moderately acid; abrupt smooth boundary.

Bt1—11 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown

(10YR 5/2) and brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of pedis; moderately acid; clear smooth boundary.

Bt2—18 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct grayish brown (10YR 5/2) and brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; many distinct grayish brown (10YR 5/2) clay films on faces of pedis; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt3—24 to 32 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct light brownish gray (10YR 6/2) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of pedis; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

2Bt4—32 to 40 inches; light brownish gray (10YR 6/2) clay loam; common medium distinct yellowish brown (10YR 5/6) and common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few distinct grayish brown (10YR 5/2) clay films on faces of pedis; few fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; slightly acid; clear smooth boundary.

2BC—40 to 50 inches; yellowish brown (10YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; firm; about 2 percent pebbles; neutral; clear smooth boundary.

2C—50 to 60 inches; yellowish brown (10YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/6) mottles; massive; friable; about 3 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 40 to 60 inches

Thickness of the loess: 25 to 40 inches

Ap horizon:

Hue—10YR

Value—4 or 5

Chroma—2 or 3

Texture—silt loam

E horizon:

Hue—10YR

Value—5 or 6

Chroma—2
Texture—silt loam

Bt horizon:

Hue—10YR
Value—5 or 6
Chroma—3 to 6
Texture—silt loam or silty clay loam

2Bt, 2BC, and 2C horizons:

Hue—10YR
Value—5 or 6
Chroma—2 to 6
Texture—loam or clay loam

Flanagan Series

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Loess and glacial till

Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aquic
Argiudolls

Typical Pedon

Flanagan silt loam, 0 to 2 percent slopes, in a cultivated field about 4 miles east of Bethany (map sheet 28); approximately 2,400 feet north and 20 feet west of the southeast corner of sec. 20, T. 14 N., R. 5 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine roots; slightly acid; abrupt distinct boundary.

A—9 to 16 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

Bt1—16 to 25 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium subangular blocky structure; firm; common very fine roots; many distinct very dark grayish brown (10YR 3/2) clay films and common prominent black (10YR 2/1) organic coatings on faces of peds; few fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt2—25 to 32 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films and few prominent black (10YR 2/1) organic

coatings on faces of peds; common fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt3—32 to 41 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4) and common fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films and few prominent black (10YR 2/1) organic coatings on faces of peds; common fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Bt4—41 to 48 inches; light olive brown (2.5Y 5/4) silt loam; common fine distinct light brownish gray (2.5Y 6/2) and common fine prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent black (10YR 2/1) organic coatings in root channels; common fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

2BCt—48 to 60 inches; light olive brown (2.5Y 5/4) loam; common medium distinct light brownish gray (2.5Y 6/2) and common medium prominent yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent black (10YR 2/1) organic coatings in root channels; few fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; neutral.

Range in Characteristics

Thickness of the loess: 40 to 55 inches

Thickness of the mollic epipedon: 11 to 18 inches

Ap and A horizons:

Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

Bt horizon:

Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—silt loam or silty clay loam

2BCt horizon and 2Bt and 2C horizons (if they occur):

Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 6
Texture—silt loam, loam, or clay loam

Hartsburg Series

Drainage class: Poorly drained

Permeability: Moderate

Landform: Till plains

Parent material: Loess

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Typic
Haplaquolls

Typical Pedon

Hartsburg silty clay loam, in a cultivated field about 5 miles northwest of Arthur (map sheet 9); approximately 2,575 feet west and 150 feet north of the southeast corner of sec. 17, T. 15 N., R. 6 E.

Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak medium granular structure; firm; common very fine roots; slightly acid; abrupt smooth boundary.

A—9 to 13 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky structure; firm; common very fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg—13 to 17 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine prominent olive brown (2.5Y 4/4) mottles; weak fine prismatic structure parting to moderate fine angular blocky; firm; few very fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few fine rounded concretions of iron and manganese oxide; neutral; clear smooth boundary.

Bkg1—17 to 24 inches; gray (10YR 5/1) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct light gray (10YR 7/2 dry) lime or carbonate coatings and very dark gray (10YR 3/1) organic coatings on faces of peds; few fine rounded soft masses of iron and manganese oxide; violently effervescent; slightly alkaline; clear smooth boundary.

Bkg2—24 to 36 inches; gray (10YR 5/1) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct light gray (10YR 7/2 dry) lime or carbonate coatings on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings in root channels; common black (10YR 2/1) krotovinas; few fine rounded soft masses of iron and manganese oxide; violently effervescent; slightly alkaline; clear smooth boundary.

BCkg—36 to 41 inches; gray (10YR 6/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to weak fine angular blocky; firm; common distinct light gray (10YR 7/2 dry) lime or carbonate coatings on faces of peds; common black (10YR 2/1) krotovinas; few fine rounded soft masses of iron and manganese oxide; violently effervescent; slightly alkaline; clear smooth boundary.

Cg—41 to 60 inches; gray (10YR 6/1) silt loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; friable; common distinct light gray (10YR 7/2 dry), soft masses of lime or carbonate; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 15 to 35 inches

Thickness of the mollic epipedon: 10 to 20 inches

Ap and A horizons:

Hue—10YR or neutral

Value—2 or 3

Chroma—0 to 2

Texture—silty clay loam

Bg, Bkg, and BCkg horizons:

Hue—10YR, 2.5Y, or 5Y

Value—3 to 5

Chroma—1 or 2

Texture—silty clay loam

Cg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—5 or 6

Chroma—1 or 2

Texture—silt loam or stratified silt loam and loam

Huntsville Series

Drainage class: Well drained

Permeability: Moderate

Landform: Flood plains

Parent material: Silty alluvium

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic
Hapludolls

Typical Pedon

Huntsville silt loam, occasionally flooded, in a pasture about 2.5 miles east of Sullivan (map sheet 34); approximately 2,075 feet west and 1,180 feet north of the southeast corner of sec. 32, T. 14 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine

granular structure; friable; many very fine and common fine roots; slightly acid; abrupt smooth boundary.

- A1—9 to 18 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many very fine and common fine roots; neutral; clear smooth boundary.
- A2—18 to 27 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; common very fine and fine roots; neutral; clear smooth boundary.
- A3—27 to 40 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; friable; common very fine and few fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; neutral; clear smooth boundary.
- AC—40 to 60 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; few very fine roots; common distinct very dark gray (10YR 3/1) organic coatings in root channels; few fine rounded soft masses of iron and manganese oxide; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 40 inches

Ap and A horizons:

Hue—10YR
Value—2 or 3
Chroma—1 to 3
Texture—silt loam

AC horizon:

Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam

C horizon (if it occurs):

Hue—10YR
Value—4 or 5
Chroma—3 or 4
Texture—dominantly silt loam; thin strata of loam and very fine sandy loam in some pedons

Lawson Series

Drainage class: Somewhat poorly drained

Permeability: Moderate

Landform: Flood plains

Parent material: Silty alluvium

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic
Hapludolls

Typical Pedon

Lawson silt loam, frequently flooded, in a cultivated field about 3.5 miles east of Bethany (map sheet 22); approximately 2,535 feet south and 700 feet west of the northeast corner of sec. 18, T. 14 N., R. 5 E.

- Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.
- A1—8 to 19 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; common very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.
- A2—19 to 32 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.
- C1—32 to 44 inches; dark grayish brown (10YR 4/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium angular blocky structure; friable; few very fine roots; few fine irregular soft masses of iron and manganese oxide; neutral; clear smooth boundary.
- C2—44 to 60 inches; dark grayish brown (2.5Y 4/2) loam; common medium prominent yellowish brown (10YR 5/6) mottles; massive; friable; few very fine roots; common fine and medium irregular soft masses of iron and manganese oxide; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 36 inches

Ap horizon:

Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam

A horizon:

Hue—10YR
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam

C horizon:

Hue—10YR or 2.5Y
Value—4 or 5
Chroma—1 to 3
Texture—silt loam, loam, or silty clay loam; stratified in some pedons

Miami Series

Drainage class: Well drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Glacial till or loess and glacial till

Slope range: 2 to 60 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Miami loam, 5 to 10 percent slopes, eroded, in a pasture about 1 mile west of Allenville (map sheet 43); approximately 1,640 feet north and 1,960 feet east of the southwest corner of sec. 20, T. 13 N., R. 6 E.

Ap—0 to 5 inches; brown (10YR 4/3) loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; common very fine and few fine roots; fragments of yellowish brown (10YR 5/4) material from the E horizon in the lower part; slightly acid; abrupt smooth boundary.

E—5 to 9 inches; yellowish brown (10YR 5/4) loam, light yellowish brown (10YR 6/4) dry; weak medium platy structure; friable; common very fine and few fine roots; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine irregular soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt1—9 to 12 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; firm; common very fine and few fine roots; few distinct light gray (10YR 7/2 dry) silt coatings and common distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 1 percent pebbles; strongly acid; clear smooth boundary.

Bt2—12 to 18 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; few very fine and fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 2 percent pebbles; moderately acid; clear smooth boundary.

Bt3—18 to 26 inches; dark yellowish brown (10YR 4/4) clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate medium angular blocky; firm; few very fine and fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 2 percent pebbles; slightly acid; clear smooth boundary.

Bt4—26 to 33 inches; dark yellowish brown (10YR 4/4) clay loam; common fine distinct yellowish brown

(10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 2 percent pebbles; neutral; clear smooth boundary.

Bt5—33 to 40 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium angular blocky; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; weakly effervescent; neutral; clear smooth boundary.

C—40 to 60 inches; brown (10YR 5/3) loam; common fine distinct yellowish brown (10YR 5/6) mottles; massive; firm; common distinct light gray (10YR 7/2 dry), soft masses of lime or carbonate; about 3 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 20 to 40 inches

Thickness of the loess: 0 to 18 inches

Ap or A horizon:

Hue—10YR

Value—3 to 5

Chroma—2 to 4

Texture—silt loam, loam, or clay loam

E horizon (if it occurs):

Hue—10YR

Value—3 to 6

Chroma—2 to 4

Texture—silt loam or loam

Bt horizon and 2Bt, BCt, or 2BCt horizon (if it occurs):

Hue—7.5YR or 10YR

Value—4 to 6

Chroma—3 to 6

Texture—silty clay loam or clay loam in the upper part, clay loam or loam in the lower part

C or 2C horizon (if it occurs):

Hue—10YR

Value—5 or 6

Chroma—3 or 4

Texture—loam

Parr Series

Drainage class: Well drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Glacial till or loess and glacial till

Slope range: 2 to 10 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Argiudolls

Taxadjunct features: The Parr soils in this survey area have a thinner dark surface layer than is defined as the range for the series. These soils are classified as fine-loamy, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Parr silt loam, 2 to 5 percent slopes, eroded, in a cultivated field about 2 miles west of Gays (map sheet 51); approximately 2,050 feet west and 40 feet north of the southeast corner of sec. 21, T. 12 N., R. 6 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine angular blocky structure parting to moderate fine granular; friable; many very fine and few fine roots; fragments of dark yellowish brown (10YR 4/4) material from the subsoil in the lower part; few fine irregular soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Bt1—8 to 15 inches; dark yellowish brown (10YR 4/4) silty clay loam; strong very fine and fine subangular blocky structure; firm; common very fine and few fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

2Bt2—15 to 26 inches; yellowish brown (10YR 5/4) clay loam; moderate fine and medium subangular blocky structure; firm; common very fine and few fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 2 percent pebbles; moderately acid; gradual smooth boundary.

2Bt3—26 to 35 inches; yellowish brown (10YR 5/4) clay loam; moderate fine prismatic structure parting to weak medium subangular blocky; firm; common very fine and few fine roots; many prominent very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 1 percent pebbles; slightly acid; clear smooth boundary.

2BCt—35 to 40 inches; yellowish brown (10YR 5/4) loam; weak fine prismatic structure; firm; few very fine and fine roots; common prominent very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine irregular soft masses of iron and manganese oxide; about 2 percent pebbles; slightly effervescent; slightly alkaline; clear smooth boundary.

2C—40 to 60 inches; brown (10YR 5/3) loam; few fine

prominent strong brown (7.5YR 5/8) mottles; massive; firm; few distinct light gray (10YR 7/2 dry), soft masses of lime or carbonate; about 2 percent pebbles; strongly effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 24 to 40 inches

Thickness of the loess: 0 to 18 inches

Thickness of the dark surface layer: 5 to 14 inches

Ap horizon:

Hue—10YR

Value—2 or 3

Chroma—1 to 3

Texture—silt loam or loam

Bt, 2Bt, and 2BCt horizons:

Hue—10YR

Value—4 or 5

Chroma—4 to 6

Texture—silty clay loam or clay loam in the upper part, clay loam or loam in the lower part

C or 2C horizon:

Hue—10YR

Value—4 to 6

Chroma—3 or 4

Texture—loam

Peotone Series

Drainage class: Very poorly drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Colluvial sediments

Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Cumulic Haplaquolls

Typical Pedon

Peotone silty clay loam, in a field of oats about 2.5 miles south of Bethany (map sheet 31); approximately 2,622 feet north and 525 feet east of the southwest corner of sec. 3, T. 13 N., R. 4 E.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; firm; many very fine and few fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

A—10 to 22 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine subangular blocky structure; firm; common very fine and few fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.

Bg1—22 to 33 inches; very dark gray (10YR 3/1) silty

clay, gray (10YR 5/1) dry; moderate fine prismatic structure parting to moderate fine and medium subangular blocky; firm; few very fine and fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; few fine rounded soft masses of iron and manganese oxide; neutral; gradual smooth boundary.

Bg2—33 to 47 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine distinct olive brown (2.5Y 4/4) mottles; moderate fine prismatic structure parting to moderate fine and medium angular blocky; firm; few very fine and fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine rounded soft masses of iron and manganese oxide; slightly alkaline; clear smooth boundary.

Cg—47 to 60 inches; olive gray (5Y 5/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; common black (10YR 2/1) krotovinas; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 inches or more

Thickness of the mollic epipedon: 24 to 36 inches

Ap and A horizons:

Hue—10YR, 5Y, or neutral

Value—2 or 3

Chroma—0 or 1

Texture—silty clay loam

Bg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—3 to 5

Chroma—1 or 2

Texture—silty clay loam or silty clay

Cg horizon:

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 or 2

Texture—silt loam or silty clay loam

Radford Series

Drainage class: Somewhat poorly drained

Permeability: Moderate

Landform: Flood plains

Parent material: Silty alluvium

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Fluvaquentic
Hapludolls

Typical Pedon

Radford silt loam, frequently flooded, approximately 780 feet north and 200 feet east of the southwest corner of

sec. 23, T. 13 N., R. 2 E., in Shelby County:

Ap—0 to 7 inches; mixed black (10YR 2/1) and very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; common very fine roots; slightly alkaline; abrupt smooth boundary.

A—7 to 13 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; friable; common very fine roots; slightly alkaline; clear smooth boundary.

C—13 to 30 inches; stratified very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) silt loam; few fine distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 3/4) mottles; massive; friable; few very fine roots; slightly alkaline; clear smooth boundary.

Ab1—30 to 40 inches; black (10YR 2/1) silty clay loam; few fine distinct dark yellowish brown (10YR 3/4) mottles; moderate medium subangular blocky structure; firm; few very fine roots; slightly alkaline; gradual smooth boundary.

Ab2—40 to 60 inches; black (10YR 2/1) silty clay loam; few fine distinct dark yellowish brown (10YR 3/4) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; slightly alkaline.

Range in Characteristics

Depth to Ab horizon: 20 to 40 inches

Thickness of the mollic epipedon: 10 to 20 inches

Ap and A horizons:

Hue—10YR

Value—2 or 3

Chroma—1 or 2

Texture—silt loam

C horizon:

Hue—10YR

Value—2 to 6

Chroma—1 or 2

Texture—silt loam; stratified in some pedons

Ab horizon:

Hue—10YR or neutral

Value—2 or 3

Chroma—0 or 1

Texture—silt loam, silty clay loam, or clay loam

Raub Series

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Glacial moraines

Parent material: Loess and glacial till

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aquic
Argiudolls

Typical Pedon

Raub silt loam, 0 to 2 percent slopes, in a cultivated field about 1.25 miles southeast of Gays (map sheet 51); approximately 1,490 feet north and 540 feet west of the southeast corner of sec. 25, T. 12 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and common fine roots; neutral; abrupt smooth boundary.

A—9 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many very fine and few fine roots; slightly acid; clear smooth boundary.

Bt1—14 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common very fine and few fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt2—24 to 35 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; common very fine and few fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

2Bt3—35 to 41 inches; yellowish brown (10YR 5/4) clay loam; few fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium angular blocky; firm; few very fine and fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; neutral; gradual smooth boundary.

2Bt4—41 to 52 inches; dark yellowish brown (10YR 4/4) silty clay loam (about 10 percent sand); many fine distinct light brownish gray (10YR 6/2) and common fine prominent strong brown (7.5YR 5/6) mottles; weak fine prismatic structure parting to weak medium angular blocky; firm; few very fine and fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; about 1

percent pebbles; slightly effervescent; neutral; clear smooth boundary.

2C—52 to 60 inches; brown (10YR 5/3) loam; many medium faint light brownish gray (10YR 6/2) and common fine prominent strong brown (7.5YR 5/6) mottles; massive; firm; few distinct light gray (10YR 7/2 dry), soft masses of lime or carbonate; about 4 percent pebbles; strongly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 inches or more

Thickness of the loess: 22 to 40 inches

Thickness of the mollic epipedon: 11 to 16 inches

Ap and A horizons:

Hue—10YR

Value—2 or 3

Chroma—1 or 2

Texture—silt loam

Bt horizon:

Hue—10YR

Value—4 or 5

Chroma—3 to 6

Texture—silty clay loam

2Bt horizon:

Hue—10YR

Value—4 or 5

Chroma—3 to 6

Texture—silty clay loam or clay loam

2C horizon:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—3 or 4

Texture—loam or clay loam

Sabina Series

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Loess and glacial till

Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aeric
Ochraqualfs

Typical Pedon

Sabina silt loam, 0 to 2 percent slopes, in a wheat field about 1 mile southeast of Kirksville (map sheet 42); approximately 1,500 feet south and 250 feet west of the northeast corner of sec. 20, T. 13 N., R. 5 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine roots;

few fine rounded soft masses of iron and manganese oxide; slightly acid; abrupt smooth boundary.

E—9 to 13 inches; brown (10YR 5/3) silt loam, light gray (10YR 7/2) dry; few fine distinct dark yellowish brown (10YR 5/6) mottles; weak thin platy structure; friable; few very fine roots; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt1—13 to 17 inches; brown (10YR 5/3) silty clay loam; common fine faint dark yellowish brown (10YR 4/4) mottles; moderate fine subangular blocky structure; firm; few very fine roots; many distinct white (10YR 8/2 dry) silt coatings and grayish brown (10YR 5/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt2—17 to 28 inches; brown (10YR 5/3) silty clay; many fine faint grayish brown (10YR 5/2), common fine faint dark yellowish brown (10YR 4/4), and common fine distinct dark yellowish brown (10YR 4/6) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; very firm; few very fine roots; common distinct white (10YR 8/1 dry) silt coatings and many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt3—28 to 36 inches; grayish brown (10YR 5/2) silty clay loam; many fine distinct yellowish brown (10YR 5/6) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt4—36 to 44 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; common fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

2Bt5—44 to 51 inches; brown (10YR 5/3) clay loam; common fine faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm;

few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; common fine rounded soft masses of iron and manganese oxide; about 1 percent pebbles; neutral; clear smooth boundary.

2BCt—51 to 60 inches; brown (10YR 5/3) loam; many medium distinct yellowish brown (10YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; few fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 44 inches or more

Thickness of the loess: 40 to 60 inches

Other features: Some pedons have a 2C horizon.

Ap horizon:

Hue—10YR

Value—4 or 5

Chroma—2

Texture—silt loam

E horizon:

Hue—10YR

Value—4 or 5

Chroma—2 or 3

Texture—silt loam

Bt horizon:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 to 4

Texture—silty clay loam or silty clay

2Bt and 2BCt horizons:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 to 4

Texture—loam or clay loam

Sawmill Series

Drainage class: Poorly drained

Permeability: Moderate

Landform: Flood plains

Parent material: Silty alluvium

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic

Haplaquolls

Typical Pedon

Sawmill silty clay loam, frequently flooded, approximately 760 feet north and 210 feet east of the southwest corner of sec. 3, T. 16 N., R. 1 W., in Macon County:

- Ap—0 to 9 inches; black (10YR 2/1) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; neutral; clear smooth boundary.
- A1—9 to 16 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; common fine faint very dark grayish brown (10YR 3/2) mottles; strong medium angular blocky structure parting to moderate fine angular blocky; firm; neutral; clear smooth boundary.
- A2—16 to 21 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine faint very dark grayish brown (10YR 3/2) mottles; weak fine prismatic structure parting to moderate fine subangular blocky; firm; common faint black (10YR 2/1) organic coatings on faces of peds; few pebbles; neutral; clear smooth boundary.
- Bg—21 to 33 inches; very dark gray (5Y 3/1) silty clay loam, gray (5Y 5/1) dry; common fine prominent dark grayish brown (10YR 4/2) mottles; moderate fine and very fine prismatic structure parting to moderate fine angular and subangular blocky; firm; many faint black (10YR 2/1) organic coatings on faces of peds; common fine irregular soft masses of iron and manganese oxide; few pebbles; neutral; gradual smooth boundary.
- Btg1—33 to 42 inches; dark gray (5Y 4/1) silty clay loam; few fine and medium prominent strong brown (7.5YR 5/6) mottles; moderate fine and very fine prismatic structure; firm; many distinct very dark gray (10YR 3/1) clay films on faces of peds; common black (N 2/0) krotovinas; common fine and medium irregular soft masses of iron and manganese oxide; few pebbles; neutral; clear smooth boundary.
- Btg2—42 to 48 inches; gray (5Y 5/1) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine and very fine prismatic; firm; common distinct dark gray (5Y 4/1) clay films on faces of peds; common black (N 2/0) krotovinas; common fine and medium irregular soft masses of iron and manganese oxide; few pebbles; neutral; gradual smooth boundary.
- BCg—48 to 60 inches; mottled gray (5Y 5/1), dark gray (5Y 4/1), and strong brown (7.5YR 4/6) clay loam; weak medium prismatic structure; firm; common black (N 2/0) krotovinas; many fine and medium

irregular soft masses of iron and manganese oxide; few pebbles; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 24 to 36 inches

Ap and A horizons:

Hue—10YR, 2.5Y, 5Y, or neutral

Value—2 or 3

Chroma—0 to 2

Texture—silty clay loam

Bg and Btg horizons:

Hue—10YR, 2.5Y, or 5Y

Value—3 to 6

Chroma—1 or 2

Texture—dominantly silty clay loam; loam in the lower part

BCg horizon and Cg horizon (if it occurs):

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 or 2

Texture—silt loam, loam, silty clay loam, or clay loam; stratified in some pedons

Starks Series

Drainage class: Somewhat poorly drained

Permeability: Moderate

Landform: Stream terraces

Parent material: Loess and glacial outwash

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aeric Ochraqualfs

Typical Pedon

Starks silt loam, 0 to 2 percent slopes, frequently flooded, in an idle area about 2.5 miles west of Allenville (map sheet 43); approximately 2,100 feet north and 300 feet west of the southeast corner of sec. 24, T. 13 N., R. 5 E.

A—0 to 5 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine angular blocky structure parting to weak very fine granular; friable; many very fine and common fine roots; few fine irregular soft masses of iron and manganese oxide; neutral; abrupt wavy boundary.

E—5 to 10 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; few fine prominent strong brown (7.5YR 4/6) mottles; strong medium platy structure parting to moderate fine granular; friable; common very fine and fine roots; few distinct light brownish gray (10YR 6/2 dry) silt coatings on faces of peds; common fine irregular soft masses of iron

and manganese oxide; neutral; abrupt wavy boundary.

BE—10 to 16 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; few fine faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) mottles; moderate medium platy structure parting to moderate very fine subangular blocky; friable; few very fine and fine roots; common distinct light gray (10YR 7/2 dry) silt coatings and many distinct gray (10YR 5/1) clay films on faces of pedis; common fine irregular soft masses of iron and manganese oxide; slightly acid; clear wavy boundary.

Bt1—16 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) mottles; moderate fine prismatic structure parting to moderate fine subangular blocky; firm; few very fine and fine roots; few distinct light gray (10YR 7/2 dry) silt coatings and many distinct dark grayish brown (10YR 4/2) clay films on faces of pedis; common fine irregular soft masses of iron and manganese oxide; moderately acid; gradual smooth boundary.

Bt2—28 to 37 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and common fine and medium prominent strong brown (7.5YR 5/8) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine and fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of pedis; common fine and medium irregular soft masses of iron and manganese oxide; moderately acid; clear wavy boundary.

2Bt3—37 to 43 inches; grayish brown (10YR 5/2) clay loam; common fine and medium prominent strong brown (7.5YR 5/8) and few fine distinct yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of pedis; few prominent very dark gray (10YR 3/1) organic coatings in root channels; common fine irregular soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

2Bt4—43 to 47 inches; yellowish brown (10YR 5/4) clay loam; common fine prominent strong brown (7.5YR 5/8) and few fine distinct grayish brown (10YR 5/2) mottles; weak fine prismatic structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of pedis; few fine irregular soft masses of iron and manganese oxide; slightly acid; clear wavy boundary.

2C—47 to 60 inches; brown (10YR 5/3) loam; common fine distinct yellowish brown (10YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles;

massive; friable; few fine irregular soft masses of iron and manganese oxide; slightly acid.

Range in Characteristics

Thickness of the loess: 24 to 40 inches

Other features: Some pedons have a BE horizon.

A horizon:

Hue—10YR
Value—3 or 4
Chroma—1 to 3
Texture—silt loam

E horizon:

Hue—10YR
Value—5 or 6
Chroma—2 or 3
Texture—silt loam

Bt and 2Bt horizons:

Hue—10YR
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam or clay loam

2C horizon:

Hue—7.5YR or 10YR
Value—5 or 6
Chroma—2 to 6
Texture—stratified sandy loam to clay loam

Sunbury Series

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Loess and glacial till

Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aquollic Hapludalfs

Typical Pedon

Sunbury silt loam, 0 to 2 percent slopes, in a cultivated field about 3.5 miles southeast of Allenville (map sheet 47); approximately 255 feet west and 2,547 feet north of the southeast corner of sec. 3, T. 12 N., R. 6 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine roots; few fine rounded soft masses of iron and manganese oxide; moderately acid; abrupt smooth boundary.

Bt1—8 to 12 inches; brown (10YR 4/3) silty clay loam; common fine faint yellowish brown (10YR 5/4) mottles; weak medium platy structure parting to moderate very fine subangular blocky; friable; common very fine roots; many distinct very dark

grayish brown (10YR 3/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt2—12 to 19 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common very fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt3—19 to 30 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common very fine roots; many distinct dark brown (10YR 3/3) clay films on faces of peds; common fine and medium irregular soft masses of iron and manganese oxide; moderately acid; gradual smooth boundary.

Bt4—30 to 43 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm; few very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common fine and medium irregular soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

2Bt5—43 to 48 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few faint brown (10YR 4/3) clay films on faces of peds; few prominent black (10YR 2/1) organic coatings in root channels; few fine irregular soft masses of iron and manganese oxide; about 1 percent pebbles; neutral; clear smooth boundary.

2C—48 to 60 inches; light olive brown (2.5Y 5/4) loam; common fine prominent grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; massive; firm; few fine irregular soft masses of iron and manganese oxide; about 2 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 45 to 60 inches

Thickness of the loess: 40 to 60 inches

Ap horizon:

Hue—10YR

Value—2 or 3

Chroma—1 or 2

Texture—silt loam

E horizon (if it occurs):

Hue—10YR

Value—3 to 5

Chroma—2 or 3

Texture—silt loam

Bt horizon:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 to 4

Texture—silty clay loam or silty clay

2Bt horizon:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 to 6

Texture—loam or clay loam

2C horizon:

Hue—10YR or 2.5Y

Value—5 or 6

Chroma—2 to 6

Texture—loam or clay loam

Tice Series

Drainage class: Somewhat poorly drained

Permeability: Moderate

Landform: Flood plains

Parent material: Silty alluvium

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Fluvaquentic Hapludolls

Typical Pedon

Tice silty clay loam, frequently flooded, in a cultivated field about 2 miles southwest of Lovington (map sheet 18); approximately 2,200 feet south and 1,000 feet west of the northeast corner of sec. 32, T. 15 N., R. 5 E.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; weak fine granular structure; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

A—10 to 18 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak very fine subangular blocky structure; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Bw1—18 to 32 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure;

firm; few very fine roots; many distinct dark brown (10YR 3/3) clay films on faces of peds; few prominent black (10YR 2/1) organic coatings in root channels; common fine irregular soft masses of iron and manganese oxide; neutral; gradual smooth boundary.

Bw2—32 to 56 inches; brown (10YR 5/3) silty clay loam; common fine faint grayish brown (10YR 5/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common faint brown (10YR 5/3) clay films on faces of peds; common fine and medium irregular soft masses of iron and manganese oxide; neutral; clear smooth boundary.

Cg—56 to 60 inches; grayish brown (10YR 5/2) silt loam; many fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; few fine rounded soft masses of iron and manganese oxide; neutral.

Range in Characteristics

Thickness of the mollic epipedon: 10 to 24 inches

Ap and A horizons:

Hue—10YR

Value—2 or 3

Chroma—1 or 2

Texture—silty clay loam

Bw horizon:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 or 3

Texture—silt loam or silty clay loam

Cg or C horizon:

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—1 to 3

Texture—silt loam, loam, silty clay loam, or clay loam; stratified in some pedons

Toronto Series

Drainage class: Somewhat poorly drained

Permeability: Moderately slow

Landform: Glacial moraines

Parent material: Loess and glacial till

Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Udollic
Ochraqualfs

Typical Pedon

Toronto silt loam, 0 to 2 percent slopes, approximately 200 feet east and 960 feet north of the southwest corner of sec. 17, T. 11 N., R. 9 E., in Coles County:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Bt—8 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; firm; common distinct brown (10YR 4/3) clay films on faces of peds; very few distinct very dark grayish brown (10YR 3/2) organic films in root channels; strongly acid; clear smooth boundary.

Btg1—14 to 22 inches; light brownish gray (10YR 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/8) mottles; moderate fine angular blocky structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Btg2—22 to 32 inches; light brownish gray (10YR 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct dark gray (10YR 4/1) clay films in root channels; few fine rounded soft masses of iron and manganese oxide; slightly acid; clear smooth boundary.

Btg3—32 to 37 inches; light brownish gray (10YR 6/2) silty clay loam; many fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few distinct grayish brown (10YR 5/2) clay films on faces of peds; few distinct dark gray (10YR 4/1) clay films in root channels; few fine rounded soft masses of iron and manganese oxide; neutral; clear smooth boundary.

2BCg—37 to 44 inches; light brownish gray (10YR 6/2) loam; many fine prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; firm; few fine rounded soft masses of iron and manganese oxide; about 2 percent gravel; neutral; clear smooth boundary.

2C—44 to 60 inches; pale brown (10YR 6/3) loam; many fine prominent yellowish brown (10YR 5/8) and common fine faint light brownish gray (10YR 6/2) mottles; massive; firm; few fine rounded soft masses of iron and manganese oxide; about 3 percent gravel; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 to 60 inches

Thickness of the loess: 25 to 40 inches

Ap horizon:

Hue—10YR
 Value—3
 Chroma—1 or 2
 Texture—silt loam

Bt and Btg horizons:

Hue—10YR or 2.5Y
 Value—4 to 6
 Chroma—1 to 4
 Texture—silty clay loam

2BCg horizon:

Hue—10YR or 2.5Y
 Value—4 to 6
 Chroma—1 or 2
 Texture—loam or clay loam

2C horizon:

Hue—10YR
 Value—5 or 6
 Chroma—3 or 4
 Texture—loam or clay loam

Wingate Series

Drainage class: Moderately well drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Loess and glacial till

Slope range: 0 to 5 percent

Taxonomic class: Fine-silty, mixed, mesic Mollic
 Hapludalfs

Typical Pedon

Wingate silt loam, 0 to 2 percent slopes, in a cultivated field about 2.5 miles east of Lake City (map sheet 7); approximately 2,150 feet east and 50 feet south of the northwest corner of sec. 17, T. 15 N., R. 5 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; few very fine roots; common distinct dark brown (10YR 3/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt2—16 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine faint yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese

oxide; moderately acid; clear smooth boundary.

Bt3—24 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds and dark grayish brown (10YR 4/2) clay films in root channels; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt4—29 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds and dark grayish brown (10YR 4/2) clay films in root channels; few fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

2Bt5—36 to 41 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct brownish yellow (10YR 6/6) and few fine distinct grayish brown (10YR 5/2) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; about 1 percent pebbles; slightly acid; clear smooth boundary.

2Bt6—41 to 47 inches; yellowish brown (10YR 5/4) clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; few very fine roots; few faint brown (10YR 4/3) clay films on faces of peds; few fine rounded soft masses of iron and manganese oxide; about 2 percent pebbles; slightly acid; clear smooth boundary.

2C—47 to 60 inches; yellowish brown (10YR 5/4) loam; few fine distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; massive; firm; few very fine roots; few fine rounded soft masses of iron and manganese oxide; about 3 percent pebbles; slightly effervescent; slightly alkaline.

Range in Characteristics

Depth to carbonates: 40 to 60 inches

Thickness of the loess: 24 to 40 inches

Ap horizon:

Hue—10YR
 Value—3
 Chroma—1 to 3
 Texture—silt loam

Bt horizon:

Hue—10YR
 Value—4 or 5
 Chroma—3 to 6
 Texture—silty clay loam

2Bt horizon:

Hue—10YR
 Value—4 or 5
 Chroma—3 to 6
 Texture—loam or clay loam

2C horizon:

Hue—10YR
 Value—5
 Chroma—3 or 4
 Texture—loam

Xenia Series

Drainage class: Moderately well drained

Permeability: Moderately slow

Landform: Till plains

Parent material: Loess and glacial till

Slope range: 0 to 5 percent

Taxonomic class: Fine-silty, mixed, mesic Aquic
 Hapludalfs

Typical Pedon

Xenia silt loam, 0 to 2 percent slopes, in a cultivated field about 4 miles west of Sullivan (map sheet 32); approximately 220 feet east and 126 feet north of the southwest corner of sec. 6, T. 13 N., R. 4 E.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; moderate medium platy structure; friable; few very fine roots; common fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

Bt1—11 to 21 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine distinct grayish brown (10YR 5/2) mottles; moderate fine angular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; strongly acid; clear smooth boundary.

Bt2—21 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and common fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular

blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; strongly acid; clear smooth boundary.

Bt3—26 to 39 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and common fine distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings in root channels; common fine rounded soft masses of iron and manganese oxide; moderately acid; clear smooth boundary.

2Bt4—39 to 48 inches; dark yellowish brown (10YR 4/4) clay loam; many medium distinct yellowish brown (10YR 5/6) and common fine distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; firm; few very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; about 3 percent pebbles; neutral; gradual smooth boundary.

2Bt5—48 to 60 inches; brown (10YR 5/3) clay loam; common fine faint grayish brown (10YR 5/2) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common fine rounded soft masses of iron and manganese oxide; about 3 percent pebbles; slightly effervescent; neutral.

Range in Characteristics

Depth to carbonates: 40 to 60 inches

Thickness of the loess: 22 to 40 inches

Other features: Some pedons have a 2BC horizon.

Ap horizon:

Hue—10YR
 Value—4
 Chroma—2 to 4
 Texture—silt loam

E horizon:

Hue—10YR
 Value—4 or 5
 Chroma—2 to 4
 Texture—silt loam

Bt horizon:

Hue—10YR
 Value—4 or 5
 Chroma—3 to 6
 Texture—silty clay loam

2Bt horizon:

Hue—10YR

Value—4 or 5

Chroma—3 to 6

Texture—loam or clay loam

2C horizon (if it occurs):

Hue—10YR

Value—5

Chroma—3 or 4

Texture—loam

Formation of the Soils

Soil is produced by soil-forming processes acting on materials deposited or accumulated by geologic agencies. The characteristics of the soil are determined by (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil formed; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of soil formation have acted on the parent material (Jenny, 1941).

Climate and plant and animal life are the active factors of soil formation. These factors act directly on the parent material, either in place or after it has been relocated by water, glaciers, or the wind, and slowly change it to a natural body that has genetically related layers, or horizons. Relief can modify the effects of climate and plant and animal life. In sloping areas, for example, erosion can inhibit the processes of soil formation. Wetness can slow these processes in level or depressional areas. The parent material also affects the kind of soil profile that is formed. Finally, time is needed for changing the parent material into a soil profile that has clearly differentiated horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless the effects of the other factors are known. Many of the processes of soil formation are unknown.

Parent Material

Parent material is the unconsolidated geologic material in which a soil forms. It determines the chemical and mineralogical composition of the soil. Most of the parent material in Moultrie County is a direct result of the glaciers and sediments of the Wisconsinan Stage (Willman and Frye, 1970). Although the kinds of parent material are associated with glacial deposits, the properties vary greatly, mostly because of varying methods of deposition. The dominant kinds of parent material in Moultrie County are glacial till, glacial outwash, alluvium, colluvium, and loess (Fehrenbacher and others, 1984). These materials

were deposited by wind, water, glaciers, or glacial meltwater. In some areas, the materials have been reworked by wind or water after they were deposited. Many of the soils formed in more than one kind of parent material. For example, some of the soils in Moultrie County formed in loess and in the underlying glacial drift.

Glacial till is material laid down directly by continental glaciers with a minimum of water action. It consists of clay, silt, sand, pebbles, and boulders, all of which are mixed together. The small pebbles have distinct edges and corners, indicating that they have not been subject to intensive washing by water.

The glacial till in Moultrie County was deposited during the Woodfordian Substage of the Wisconsinan Glaciation, the most recent glaciation (Willman and Frye, 1970). The Shelbyville Moraine, a distinct landform feature of this glaciation, is in the southeast corner of the county. This terminal moraine, or undulating ridge, marks the farthest advance of the Wisconsinan Glaciation in Illinois. The glacial till that makes up the moraine and underlies most of the county is calcareous loam or clay loam.

Soils that formed entirely in till are generally on strongly sloping to very steep side slopes. Miami soils are examples. In most areas of the county, the glacial till is overlain by loess of varying thickness. Dana, Flanagan, and Xenia soils formed in loess and in the underlying loamy glacial till.

Glacial outwash is stratified material removed or "washed out" from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of an active glacier. The size of the particles that make up outwash varies, depending on the velocity of the moving water. The coarser material is deposited nearer to the ice. Most of the outwash deposits were later covered by loess. Camden, Drummer, and Starks soils formed in loess and in the underlying glacial outwash.

Alluvium is material that was deposited by floodwater from streams. Soils that formed in alluvium are generally stratified in both color and texture. The alluvial soils mostly consist of silty sediments, but in some

places the soils have thin layers of loamy and sandy material. Huntsville and Lawson soils formed in silty alluvium and have weakly developed horizons. The largest area of alluvial soils is along the Kaskaskia River and its tributaries.

Colluvium is material that is similar to alluvium in composition but was deposited by gravity at the base of slopes or by slopewash into closed depressions. The material is silty or clayey and generally is dark. Peotone soils formed in colluvial sediments.

Loess is material deposited by the wind. It consists of uniform, calcareous, silt-sized particles. The meltwaters from the glaciers carried vast quantities of silt, which were deposited in the major river valleys. As these sediments were exposed when the meltwaters subsided, the winds carried the silts and deposited them over much of the land. Most of the soils in the county formed at least partially in loess. The thickness of the loess ranges from virtually zero in areas where slopes are very steep to about 3 to 5 feet in the nearly level areas on uplands. Flanagan soils are in these areas. They formed in about 48 inches of loess and in the underlying loamy glacial till.

Climate

Climate is important in the formation of soils. Moultrie County has a temperate, humid, continental climate that is essentially uniform throughout the county. Climatic differences within the county are too small to have caused any obvious differences among the soils. In some areas, however, the effects of climate are modified locally by relief.

Climate affects soil formation through its effects on weathering, plant and animal life, and erosion. Water from rains and melting snow seeps slowly downward through the soil and allows physical and chemical reactions to take place in the parent material. Where the water can move downward, it moves clay from the surface soil into the subsoil. The water dissolves minerals and moves them downward through the soil. In soils having limy parent materials, this leaching has removed calcium carbonate, or free lime, to depths of about 40 inches. As a result, these soils are neutral to strongly acid and other pedogenic processes, such as the biochemical breakdown of minerals and the translocation of clay, can take place.

The temperature of the soil affects soil formation. When the soil is frozen, for example, many of the processes of soil formation are halted or retarded.

Climate also influences the kind and extent of plant and animal life. The climate in Moultrie County has favored tall prairie grasses and deciduous hardwoods. It

also has favored animal life, which decomposes dead plants and incorporates them into the soil.

Heavy, untimely rains are destructive when they fall on soils that have been exposed by farming. Early spring rains in these areas can cause extensive erosion when the soils are partially frozen and more water runs off the surface.

Plant and Animal Life

Soils are greatly affected by the type of vegetation under which they formed. The chief contribution of vegetation and biological processes to soil formation is the addition of organic material and nitrogen to the soil. The amount of organic material in the soil depends primarily on the kind of native plants that grew on the soil. The remains of plants accumulated on or below the surface, decayed, and eventually became organic matter or humus. The roots of the plants provided channels for the downward movement of water through the soil and added organic matter as they decayed.

The native vegetation in Moultrie County consisted primarily of tall prairie grasses and, to a lesser extent, deciduous hardwoods. At the time of early settlement, about 77 percent of the county supported prairie grasses. These grasses have many fibrous roots that contributed large amounts of organic matter to the soil, especially where they were concentrated near the surface. Soils that formed under prairie vegetation have a thick, black or dark brown surface layer. They generally are in areas of low relief that are relatively undissected by drainageways. Dana, Drummer, and Flanagan soils are examples.

About 23 percent of the county supported timber at the time of early settlement. The organic matter that deciduous hardwoods contributed to the soil was mainly leaf litter because the root systems of the hardwoods were less fibrous than those of grasses and generally were not so concentrated near the surface. The soils that formed under forest vegetation have a surface layer that is thinner and lighter colored than that of the prairie soils. Miami, Sabina, and Xenia soils formed under forest vegetation. They generally are on summits and on side slopes along drainageways.

Micro-organisms, earthworms, insects, and burrowing animals that live in or on the soil have also affected soil formation. Bacteria and fungi help to decompose plant and animal remains and change them into humus. Burrowing animals, such as earthworms, cicadas, and ground squirrels, help to incorporate the humus into the soil. Humus is very important in the formation of soil structure and good tilth.

Human activities, such as installing subsurface

drains, building levees for flood protection, and employing soil conservation practices, can extensively affect soil formation.

Relief

Relief, or local changes in elevation, has markedly affected the soils in Moultrie County through its effect on runoff, erosion, and natural drainage. Relief largely determines how much water infiltrates the soil and how much runs off the surface. On the steeper slopes, runoff is most rapid and the rate of water infiltration is lowest. In low areas, water is temporarily ponded by runoff from the adjacent slopes.

Relief also affects the natural drainage of the soil, or the depth to a seasonal high water table. Because of its effect on aeration of the soil, natural drainage in turn determines the color of the subsoil. The very poorly drained Peotone soils are in shallow closed depressions. They are ponded or have a seasonal high water table near the surface in the early part of the growing season. The soil pores are essentially devoid of oxygen, and the naturally occurring iron and manganese compounds in the soil are in a reduced chemical state. The subsoil is dull gray and mottled. In the more sloping, well drained Miami soils, the seasonal high water table is generally below a depth of 6 feet. The pores in these soils have an abundant supply of oxygen, and the iron and manganese compounds are in an oxidized chemical state. The subsoil, which is brownish, appears brightly colored.

Relief also affects the susceptibility to and intensity of both geologic and recent accelerated erosion. Soils on the steeper slopes and in areas where slopes are long are more susceptible to erosion than soils that formed in nearly level or level areas or where slopes are short. Maintaining a cover of vegetation or plant residue on much or all of the soil surface can significantly reduce the hazard of erosion caused by relief. For example, Miami soils that have slopes of 18

to 60 percent generally support trees, herbaceous plants, and grasses. Because of the vegetative cover, these soils are susceptible to little or no erosion. Most areas of Miami soils that have slopes of 2 to 18 percent are cultivated. Failure to maintain erosion-control systems on these soils has resulted in moderate or severe accelerated erosion of the surface soil.

Time

To a great extent, time determines the degree of profile development in a soil. The influence of time, however, is modified by wetness, erosion, the deposition of material, and local relief.

The differences among soils resulting from the length of time that the parent material has been in place are commonly expressed in the degree of profile development. Lawson soils have a very weakly expressed profile because they are on low flood plains that periodically receive new alluvial sediments. Thus they have not been in place long enough for the development of distinct horizons. Sabina soils, however, which are on till plains, are more strongly developed than the Lawson soils. They have distinct horizons because the loess and underlying glacial till in which they formed has been in place a much longer time.

In most of the upland soils, enough time has passed to allow the removal of calcium carbonates from the upper 40 inches of the profile. In the sloping to very steep Miami soils, however, the relief has influenced the amount of water that runs off instead of percolating through the soil and leaching the calcium carbonates. These soils still have calcium carbonates above a depth of 40 inches.

Erosion continually removes the most recently exposed material and thus tends to allow leaching in fresh geologic material. The steeper soils are morphologically younger than the soils in the more stable landform positions.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of clay.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

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 carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landform that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural

class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

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. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles 2 millimeters to 38 centimeters (15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvial sediments. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited in depressions or on toe slopes at the base of slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to

pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and

wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by

water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Free carbonates. Usually refers to the combination of calcium and calcium dioxide (calcium carbonate) that effervesces visibly with cold hydrochloric acid.

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.

Geomorphic processes. Natural geologic forces, such

as glaciation, that change the features on the surface of the earth.

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 meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition

between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential.

They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops.

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 the wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon or horizons having high base saturation and pedogenic soil structure. May include the upper part of the subsoil.

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, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. In this soil survey, the ratings for the content of organic matter in the Ap horizon or in the upper 10 inches of the soil are as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.1 to 2.0 percent
Moderate	2.1 to 4.0 percent
High	more than 4.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, and *plowpan*.

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 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 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and

alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The geomorphic component that forms the uppermost inclined surface at the top of a hillslope. It is the transition zone from back slope to summit of an upland. The surface is dominantly convex in profile and erosional in origin.

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.

Side slope. The slope bounding a drainageway and lying between the drainageway and the adjacent interfluve. It is generally linear along the slope width, and overland flow is parallel down the slope.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this soil survey, the classes of slope are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Moderately sloping	5 to 10 percent
Strongly sloping	10 to 18 percent
Steep	18 to 35 percent
Very steep	35 to 60 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of

climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. 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 if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Strippcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. A general term for the top, or highest level, of an upland feature, such as a hill.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in

stream valleys by glacial meltwater. In nonglaciaded regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

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 oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Wisconsinan. Pertaining to the stage of continental glaciation that followed the Illinoian Stage. Radiocarbon dating places the Wisconsinan Stage occurring between approximately 75,000 years before present and 7,000 years before present.

Woodfordian Substage. The last major advance of a Wisconsinan glacier into the area that is now Illinois. This substage occurred during the period approximately 22,000 years before present to 12,500 years before present and marked the farthest advance of the Wisconsinan glaciation in Illinois.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION
(Recorded in the period 1961-90 at Windsor, Illinois)

Month	Temperature						Precipitation			
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--	
° F	° F	° F	° F	° F	Units	In	In	In		
January-----	34.4	17.3	25.8	62	-14	17	1.79	0.68	2.83	4
February-----	39.6	21.6	30.6	66	-8	36	1.90	.95	2.73	4
March-----	52.1	32.3	42.2	80	8	168	3.37	1.86	4.71	7
April-----	65.3	42.7	54.0	85	22	427	3.74	1.90	5.34	7
May-----	75.3	52.5	63.9	91	33	737	4.00	2.08	5.68	6
June-----	84.1	61.4	72.7	96	44	968	3.69	1.98	5.20	6
July-----	87.4	65.1	76.2	99	49	1,120	3.99	2.21	5.56	6
August-----	85.3	62.7	74.0	98	46	1,041	3.15	1.20	4.77	5
September---	80.1	56.2	68.2	95	36	813	3.13	1.23	4.73	5
October-----	67.7	44.8	56.2	87	25	505	2.84	1.20	4.23	5
November-----	53.0	34.8	43.9	77	12	186	3.29	1.54	4.79	5
December-----	39.3	23.2	31.2	66	-7	40	3.37	1.34	5.08	5
Yearly:										
Average---	63.6	42.9	53.3	---	---	---	---	---	---	---
Extreme---	103	-22	---	100	-15	---	---	---	---	---
Total-----	---	---	---	---	---	6,059	38.26	32.36	43.47	65

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL
 (Recorded in the period 1961-90 at Windsor, Illinois)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 12	Apr. 20	May 6
2 years in 10 later than--	Apr. 7	Apr. 15	Apr. 30
5 years in 10 later than--	Mar. 28	Apr. 5	Apr. 20
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 26	Oct. 15	Oct. 6
2 years in 10 earlier than--	Oct. 31	Oct. 20	Oct. 11
5 years in 10 earlier than--	Nov. 10	Oct. 29	Oct. 21

TABLE 3.--GROWING SEASON
 (Recorded in the period 1961-90 at Windsor, Illinois)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	199	183	159
8 years in 10	205	191	167
5 years in 10	217	205	182
2 years in 10	229	219	197
1 year in 10	235	226	205

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
27B2	Miami silt loam, 2 to 5 percent slopes, eroded-----	270	0.1
27C2	Miami loam, 5 to 10 percent slopes, eroded-----	3,515	1.6
27C3	Miami clay loam, 5 to 10 percent slopes, severely eroded-----	240	0.1
27D	Miami loam, 10 to 18 percent slopes-----	625	0.3
27D2	Miami loam, 10 to 18 percent slopes, eroded-----	2,905	1.3
27D3	Miami clay loam, 10 to 18 percent slopes, severely eroded-----	505	0.2
27F	Miami loam, 18 to 35 percent slopes-----	3,925	1.8
27G	Miami loam, 35 to 60 percent slopes-----	1,375	0.6
56A	Dana silt loam, 0 to 2 percent slopes-----	11,430	5.2
56B2	Dana silt loam, 2 to 5 percent slopes, eroded-----	8,755	4.0
134A	Camden silt loam, 0 to 2 percent slopes-----	740	0.3
134B2	Camden silt loam, 2 to 5 percent slopes, eroded-----	875	0.4
152	Drummer silty clay loam-----	78,725	35.8
154A	Flanagan silt loam, 0 to 2 percent slopes-----	65,375	29.7
221B2	Parr silt loam, 2 to 5 percent slopes, eroded-----	1,085	0.5
221C2	Parr loam, 5 to 10 percent slopes, eroded-----	1,820	0.8
234A	Sunbury silt loam, 0 to 2 percent slopes-----	2,955	1.4
236A	Sabina silt loam, 0 to 2 percent slopes-----	2,660	1.2
244	Hartsburg silty clay loam-----	1,015	0.5
291A	Xenia silt loam, 0 to 2 percent slopes-----	4,720	2.1
291B2	Xenia silt loam, 2 to 5 percent slopes, eroded-----	9,745	4.4
330	Peotone silty clay loam-----	450	0.2
348A	Wingate silt loam, 0 to 2 percent slopes-----	1,620	0.7
348B2	Wingate silt loam, 2 to 5 percent slopes, eroded-----	665	0.3
353A	Toronto silt loam, 0 to 2 percent slopes-----	80	*
481A	Raub silt loam, 0 to 2 percent slopes-----	385	0.2
496A	Fincastle silt loam, 0 to 2 percent slopes-----	40	*
1402	Colo silty clay loam, wet-----	1,170	0.5
3074	Radford silt loam, frequently flooded-----	50	*
3107	Sawmill silty clay loam, frequently flooded-----	50	*
3132A	Starks silt loam, 0 to 2 percent slopes, frequently flooded-----	475	0.2
3284	Tice silty clay loam, frequently flooded-----	725	0.3
3402	Colo silty clay loam, frequently flooded-----	2,290	1.1
3451	Lawson silt loam, frequently flooded-----	2,680	1.2
8077	Huntsville silt loam, occasionally flooded-----	245	0.1
	Water-----	6,070	2.8
	Total-----	220,255	100.0

* Less than 0.05 percent. The combined total of the soils assigned an asterisk in the "Percent" column is about 0.1 percent of the survey area.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
27B2	Miami silt loam, 2 to 5 percent slopes, eroded
56A	Dana silt loam, 0 to 2 percent slopes
56B2	Dana silt loam, 2 to 5 percent slopes, eroded
134A	Camden silt loam, 0 to 2 percent slopes
134B2	Camden silt loam, 2 to 5 percent slopes, eroded
152	Drummer silty clay loam (where drained)
154A	Flanagan silt loam, 0 to 2 percent slopes
221B2	Parr silt loam, 2 to 5 percent slopes, eroded
234A	Sunbury silt loam, 0 to 2 percent slopes
236A	Sabina silt loam, 0 to 2 percent slopes (where drained)
244	Hartsburg silty clay loam (where drained)
291A	Xenia silt loam, 0 to 2 percent slopes
291B2	Xenia silt loam, 2 to 5 percent slopes, eroded
330	Peotone silty clay loam (where drained)
348A	Wingate silt loam, 0 to 2 percent slopes
348B2	Wingate silt loam, 2 to 5 percent slopes, eroded
353A	Toronto silt loam, 0 to 2 percent slopes (where drained)
481A	Raub silt loam, 0 to 2 percent slopes
496A	Fincastle silt loam, 0 to 2 percent slopes (where drained)
3074	Radford silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
3107	Sawmill silty clay loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
3284	Tice silty clay loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
3402	Colo silty clay loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
3451	Lawson silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
8077	Huntsville silt loam, occasionally flooded

TABLE 6.--LAND CAPABILITY AND 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	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay	Brome-grass-alfalfa
		Bu	Bu	Bu	Bu	Tons	AUM*
27B2----- Miami	IIe	116	39	49	41	4.6	7.7
27C2----- Miami	IIIe	114	38	48	40	4.5	7.5
27C3----- Miami	IVe	105	35	44	37	4.2	7.0
27D----- Miami	IVe	112	37	47	40	4.4	7.4
27D2----- Miami	IVe	109	36	46	39	4.3	7.2
27D3----- Miami	VIe	---	---	---	---	4.0	6.6
27F----- Miami	VIe	---	---	---	---	---	6.0
27G----- Miami	VIIe	---	---	---	---	---	---
56A----- Dana	I	143	45	60	85	5.5	9.1
56B2----- Dana	IIe	137	43	57	82	5.3	8.7
134A----- Camden	I	125	39	55	72	5.0	8.3
134B2----- Camden	IIe	120	37	53	69	4.8	8.0
152----- Drummer	IIw	154	51	61	83	5.5	9.2
154A----- Flanagan	I	162	52	67	92	6.1	10.2
221B2----- Parr	IIe	124	42	55	75	5.1	8.5
221C2----- Parr	IIIe	121	41	54	73	5.0	8.3
234A----- Sunbury	I	149	45	62	84	5.6	8.1
236A----- Sabina	IIw	133	42	56	75	5.2	8.7
244----- Hartsburg	IIw	145	47	56	79	5.3	8.7

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass- alfalfa hay	Bromegrass- alfalfa
		Bu	Bu	Bu	Bu	Tons	AUM*
291A----- Xenia	I	126	41	59	72	4.8	8.0
291B2----- Xenia	IIe	121	39	53	69	4.6	7.7
330----- Peotone	IIw	123	42	43	58	4.2	---
348A----- Wingate	I	133	42	56	79	5.1	8.5
348B2----- Wingate	IIe	128	40	54	76	4.9	8.2
353A----- Toronto	IIw	141	44	59	80	5.4	9.1
481A----- Raub	IIw	155	51	63	92	6.1	10.2
496A----- Fincastle	IIw	131	41	55	73	5.0	8.4
1402----- Colo	Vw	---	---	---	---	---	---
3074----- Radford	IIIw	129	41	54	76	5.0	7.5
3107----- Sawmill	IIIw	132	42	49	68	5.0	7.5
3132A----- Starks	IIw	116	36	50	65	4.6	7.1
3284----- Tice	IIIw	138	42	55	76	5.1	7.6
3402----- Colo	IIIw	134	43	48	67	4.8	7.1
3451----- Lawson	IIIw	145	43	56	77	5.1	7.6
8077----- Huntsville	IIw	152	48	64	86	5.8	8.5

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)	
		Erosion (e)	Wetness (w)
		<u>Acres</u>	<u>Acres</u>
I	86,840	---	---
II	105,470	21,395	84,075
III	11,130	5,335	5,795
IV	3,770	3,770	---
V	1,170	---	1,170
VI	4,430	4,430	---
VII	1,375	1,375	---
VIII	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	Productivity class*	
27B2, 27C2----- Miami	5A	Slight	Slight	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	
27C3----- Miami	5A	Moderate	Slight	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	
27D, 27D2----- Miami	5A	Slight	Slight	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	
27D3----- Miami	5A	Moderate	Slight	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	
27F----- Miami	5R	Moderate	Moderate	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	
27G----- Miami	5R	Severe	Severe	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	Productivity class*	
134A, 134B2----- Camden	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-----	95	7	Yellow-poplar, white oak, green ash, black walnut, eastern white pine, red pine, black locust, white ash.
							White oak-----	85	5	
							Northern red oak----	85	5	
							Sweetgum-----	80	6	
							Green ash-----	76	5	
236A----- Sabina	4A	Slight	Slight	Slight	Slight	Moderate	White oak-----	80	4	White oak, northern red oak, black walnut, eastern cottonwood, American sycamore, sugar maple, Scotch pine, eastern white pine.
							Northern red oak----	80	4	
							Black walnut-----	---	---	
291A, 291B2----- Xenia	5A	Slight	Slight	Slight	Slight	Moderate	White oak-----	90	5	Yellow-poplar, eastern white pine, red pine, black walnut, white ash.
							Yellow-poplar-----	98	7	
							Sweetgum-----	76	5	
496A----- Fincastle	4A	Slight	Slight	Slight	Slight	Moderate	Northern red oak----	75	4	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
							White oak-----	75	4	
							Pin oak-----	85	5	
							Yellow-poplar-----	85	6	
							Sweetgum-----	80	6	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index	Productivity class*	
3107----- Sawmill	5W	Slight	Moderate	Moderate	Moderate	Severe	Pin oak----- Eastern cottonwood-- Sweetgum----- Cherrybark oak----- American sycamore---	90 --- --- --- ---	5 --- --- --- ---	American sycamore, black spruce, hackberry, European larch, green ash, pin oak, red maple, swamp white oak.
3132A----- Starks	4A	Slight	Slight	Slight	Slight	Moderate	White oak----- Yellow-poplar----- Northern red oak---	80 90 80	4 6 4	White oak, yellow-poplar, green ash, sugar maple, American sycamore.
3284----- Tice	5A	Slight	Slight	Slight	Slight	Severe	Pin oak----- Sweetgum----- Yellow-poplar----- Virginia pine----- Eastern cottonwood-- White ash-----	96 86 90 90 --- ---	5 7 6 9 --- ---	Yellow-poplar, eastern cottonwood, American sycamore, green ash, red maple, cherrybark oak.
3451----- Lawson	2W	Slight	Moderate	Slight	Slight	Severe	Silver maple----- White ash----- Red maple-----	70 --- ---	2 --- ---	White spruce, silver maple, white ash.
8077----- Huntsville	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar----- Eastern cottonwood-- American sycamore--- Cherrybark oak----- Sweetgum----- Green ash-----	98 110 --- --- --- ---	7 11 --- --- --- ---	Eastern cottonwood, American sycamore, green ash, black walnut, red maple, sugar maple, hackberry.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
27B2, 27C2, 27C3, 27D, 27D2, 27D3, 27F, 27G----- Miami	Arrowwood, hazelnut, shadbush, American cranberrybush, silky dogwood, nannyberry.	White fir, blue spruce, northern whitecedar, redcedar, Washington hawthorn.	Norway spruce, Austrian pine, Douglas-fir.	Eastern white pine, pin oak.
56A, 56B2----- Dana	Arrowwood, hazelnut, shadbush, American cranberrybush, nannyberry, silky dogwood.	White fir, blue spruce, northern whitecedar, redcedar, Washington hawthorn.	Norway spruce, Austrian pine, Douglas-fir.	Eastern white pine, pin oak.
134A, 134B2----- Camden	Arrowwood, hazelnut, shadbush, silky dogwood, American cranberrybush, nannyberry.	White fir, blue spruce, northern whitecedar, redcedar, Washington hawthorn.	Norway spruce, Austrian pine, Douglas-fir.	Eastern white pine, pin oak.
152----- Drummer	American cranberrybush, nannyberry, silky dogwood, arrowwood, hazelnut, shadbush.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, redcedar.	Eastern white pine, Douglas-fir.	Pin oak.
154A----- Flanagan	Arrowwood, hazelnut, silky dogwood, shadbush, American cranberrybush, nannyberry.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
221B2, 221C2----- Parr	Arrowwood, hazelnut, American cranberrybush, shadbush, silky dogwood, nannyberry.	White fir, blue spruce, northern whitecedar, redcedar, Washington hawthorn.	Norway spruce, Austrian pine, Douglas-fir.	Eastern white pine, pin oak.
234A----- Sunbury	Silky dogwood, hazelnut, American cranberrybush, arrowwood, shadbush, nannyberry.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine, redcedar.	Norway spruce, Douglas-fir.	Pin oak, eastern white pine.
236A----- Sabina	Silky dogwood, arrowwood, hazelnut, nannyberry, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Pin oak, eastern white pine.
244----- Hartsburg	Silky dogwood, hazelnut, American cranberrybush, arrowwood, shadbush, nannyberry.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce, redcedar.	Eastern white pine, Douglas-fir.	Pin oak.
291A, 291B2----- Xenia	Arrowwood, hazelnut, shadbush, American cranberrybush, nannyberry, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
330----- Peotone	Silky dogwood, hazelnut, arrowwood, shadbush, American cranberrybush, nannyberry.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn, redcedar.	Eastern white pine, Douglas-fir.	Pin oak.
348A, 348B2----- Wingate	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	White fir, blue spruce, northern whitecedar, redcedar, Washington hawthorn.	Norway spruce, Austrian pine, Douglas-fir.	Eastern white pine, pin oak.
353A----- Toronto	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
481A----- Raub	Arrowwood, hazelnut, nannyberry, American cranberrybush, shadbush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
496A----- Fincastle	Arrowwood, hazelnut, nannyberry, American cranberrybush, shadbush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
1402----- Colo	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Norway spruce, Austrian pine, blue spruce, white fir, northern whitecedar, Washington hawthorn, redcedar.	Eastern white pine, Douglas-fir.	Pin oak.
3074----- Radford	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
3107----- Sawmill	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn, redcedar.	Eastern white pine, Douglas-fir.	Pin oak.
3132A----- Starks	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
3284----- Tice	Silky dogwood, nannyberry, American cranberrybush, hazelnut, shadbush, arrowwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
3402----- Colo	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Norway spruce, Austrian pine, blue spruce, white fir, northern whitecedar, Washington hawthorn, redcedar.	Eastern white pine, Douglas-fir.	Pin oak.
3451----- Lawson	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.
8077----- Huntsville	Arrowwood, hazelnut, nannyberry, American cranberrybush, silky dogwood, shadbush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn, redcedar.	Norway spruce, Douglas-fir.	Eastern white pine, pin oak.

TABLE 10.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe")

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
27B2----- Miami	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Moderate: erodes easily.	Slight.
27C2, 27C3----- Miami	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
27D, 27D2, 27D3----- Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
27F, 27G----- Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
56A----- Dana	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
56B2----- Dana	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
134A----- Camden	Slight-----	Slight-----	Slight-----	Severe: erodes easily.	Slight.
134B2----- Camden	Slight-----	Slight-----	Moderate: slope.	Severe: erodes easily.	Slight.
152----- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
154A----- Flanagan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
221B2----- Parr	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight-----	Slight.
221C2----- Parr	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight-----	Slight.
234A----- Sunbury	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
236A----- Sabina	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
244----- Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
291A----- Xenia	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: erodes easily.	Slight.
291B2----- Xenia	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Severe: erodes easily.	Slight.
330----- Peotone	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
348A----- Wingate	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
348B2----- Wingate	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
353A----- Toronto	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
481A----- Raub	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
496A----- Fincastle	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
1402----- Colo	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.
3074----- Radford	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
3107----- Sawmill	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.
3132A----- Starks	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: wetness, flooding.
3284----- Tice	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
3402----- Colo	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: wetness, flooding.
3451----- Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
8077----- Huntsville	Severe: flooding.	Slight-----	Moderate: flooding.	Slight-----	Moderate: flooding.

TABLE 11.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor")

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
27B2----- Miami	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
27C2, 27C3----- Miami	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27D, 27D2, 27D3---- Miami	Poor	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
27F, 27G----- Miami	Very poor.	Poor	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
56A, 56B2----- Dana	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
134A, 134B2----- Camden	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
152----- Drummer	Fair	Good	Good	Fair	Good	Good	Good	Fair	Good.
154A----- Flanagan	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
221B2----- Parr	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
221C2----- Parr	Fair	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
234A----- Sunbury	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
236A----- Sabina	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
244----- Hartsburg	Fair	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
291A, 291B2----- Xenia	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
330----- Peotone	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
348A, 348B2----- Wingate	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
353A----- Toronto	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
481A----- Raub	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.
496A----- Fincastle	Fair	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements						Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1402----- Colo	Good	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
3074----- Radford	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
3107----- Sawmill	Good	Good	Good	Fair	Good	Fair	Good	Fair	Fair.
3132A----- Starks	Fair	Good	Good	Good	Fair	Fair	Good	Good	Good.
3284----- Tice	Poor	Fair	Fair	Good	Fair	Fair	Good	Good	Fair.
3402----- Colo	Good	Fair	Good	Fair	Good	Good	Fair	Fair	Good.
3451----- Lawson	Good	Good	Fair	Good	Fair	Fair	Good	Good	Fair.
8077----- Huntsville	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

TABLE 12.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
27B2----- Miami	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
27C2, 27C3----- Miami	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
27D, 27D2, 27D3--- Miami	Moderate: dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
27F, 27G----- Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
56A, 56B2----- Dana	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
134A, 134B2----- Camden	Slight-----	Moderate: shrink-swell.	Slight-----	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
152----- Drummer	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
154A----- Flanagan	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
221B2----- Parr	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
221C2----- Parr	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
234A----- Sunbury	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
236A----- Sabina	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
244----- Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
291A, 291B2----- Xenia	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
330----- Peotone	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
348A, 348B2----- Wingate	Moderate: dense layer, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
353A----- Toronto	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
481A----- Raub	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
496A----- Fincastle	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
1402----- Colo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: wetness, flooding.
3074----- Radford	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: flooding.
3107----- Sawmill	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
3132A----- Starks	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: flooding.
3284----- Tice	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
3402----- Colo	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Severe: wetness, flooding.
3451----- Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
8077----- Huntsville	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.

TABLE 13.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
27B2----- Miami	Severe: percs slowly.	Moderate: seepage, slope.	Slight-----	Slight-----	Good.
27C2, 27C3----- Miami	Severe: percs slowly.	Severe: slope.	Slight-----	Slight-----	Good.
27D, 27D2, 27D3----- Miami	Severe: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
27F, 27G----- Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
56A, 56B2----- Dana	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Slight-----	Fair: too clayey, wetness.
134A----- Camden	Slight-----	Moderate: seepage.	Severe: seepage.	Slight-----	Fair: too clayey.
134B2----- Camden	Slight-----	Moderate: seepage, slope.	Severe: seepage.	Slight-----	Fair: too clayey.
152----- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
154A----- Flanagan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
221B2----- Parr	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
221C2----- Parr	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight-----	Fair: too clayey.
234A----- Sunbury	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
236A----- Sabina	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
244----- Hartsburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
291A, 291B2----- Xenia	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
330----- Peotone	Severe: ponding, percs slowly.	Slight-----	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
348A, 348B2----- Wingate	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
353A----- Toronto	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
481A----- Raub	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
496A----- Fincastle	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
1402----- Colo	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
3074----- Radford	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3107----- Sawmill	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3132A----- Starks	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3284----- Tice	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack.
3402----- Colo	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
3451----- Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
8077----- Huntsville	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.

TABLE 14.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
27B2, 27C2, 27C3----- Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
27D, 27D2, 27D3----- Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
27F, 27G----- Miami	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
56A, 56B2----- Dana	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
134A, 134B2----- Camden	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
152----- Drummer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
154A----- Flanagan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
221B2, 221C2----- Parr	Good-----	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
234A----- Sunbury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
236A----- Sabina	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
244----- Hartsburg	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
291A, 291B2----- Xenia	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
330----- Peotone	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
348A, 348B2----- Wingate	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
353A----- Toronto	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
481A----- Raub	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
496A----- Fincastle	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1402----- Colo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3074----- Radford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
3107----- Sawmill	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3132A----- Starks	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
3284----- Tice	Fair: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
3402----- Colo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3451----- Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
8077----- Huntsville	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 15.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
27B2, 27C2, 27C3-- Miami	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, rooting depth.	Erodes easily	Erodes easily, rooting depth.
27D, 27D2, 27D3, 27F, 27G----- Miami	Severe: slope.	Severe: piping.	Deep to water	Slope, rooting depth.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
56A----- Dana	Moderate: seepage.	Moderate: thin layer.	Deep to water	Favorable-----	Erodes easily	Erodes easily.
56B2----- Dana	Moderate: seepage, slope.	Moderate: thin layer.	Deep to water	Slope-----	Erodes easily	Erodes easily.
134A----- Camden	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
134B2----- Camden	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
152----- Drummer	Moderate: seepage.	Severe: ponding.	Ponding, frost action.	Ponding-----	Ponding-----	Wetness.
154A----- Flanagan	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness-----	Erodes easily, wetness.	Erodes easily.
221B2, 221C2----- Parr	Moderate: seepage, slope.	Severe: thin layer.	Deep to water	Slope, rooting depth.	Favorable-----	Erodes easily, rooting depth.
234A----- Sunbury	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness-----	Erodes easily, wetness.	Erodes easily.
236A----- Sabina	Slight-----	Severe: wetness.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
244----- Hartsburg	Moderate: seepage.	Severe: ponding.	Ponding, frost action.	Ponding-----	Ponding-----	Wetness.
291A----- Xenia	Moderate: seepage.	Moderate: thin layer, wetness.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
291B2----- Xenia	Moderate: seepage, slope.	Moderate: thin layer, wetness.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Erodes easily.
330----- Peotone	Slight-----	Severe: ponding.	Ponding, frost action.	Ponding-----	Ponding-----	Wetness.
348A----- Wingate	Moderate: seepage.	Severe: thin layer.	Frost action---	Wetness-----	Erodes easily, wetness.	Erodes easily.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
348B2----- Wingate	Moderate: seepage, slope.	Severe: thin layer.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Erodes easily.
353A----- Toronto	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness-----	Wetness-----	Wetness.
481A----- Raub	Slight-----	Severe: wetness.	Frost action---	Wetness-----	Erodes easily, wetness.	Wetness, erodes easily.
496A----- Fincastle	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
1402----- Colo	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness-----	Wetness.
3074----- Radford	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness-----	Wetness.
3107----- Sawmill	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness-----	Wetness.
3132A----- Starks	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
3284----- Tice	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness-----	Wetness.
3402----- Colo	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness-----	Wetness.
3451----- Lawson	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
8077----- Huntsville	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Flooding-----	Favorable-----	Favorable.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27B2----- Miami	0-6	Silt loam-----	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	6-39	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	39-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27C2----- Miami	0-9	Loam-----	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	9-40	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	40-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27C3----- Miami	0-4	Clay loam-----	CL	A-6	0	100	90-100	75-95	65-95	30-40	15-20
	4-33	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	33-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27D----- Miami	0-9	Loam-----	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	9-40	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	40-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27D2----- Miami	0-7	Loam-----	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	7-35	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	35-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27D3----- Miami	0-3	Clay loam-----	CL	A-6	0	100	90-100	75-95	65-95	30-40	15-20
	3-25	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	25-30	Loam-----	CL, SC	A-4, A-6	0-3	85-100	85-100	70-90	40-90	25-35	8-15
	30-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27F----- Miami	0-7	Loam-----	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	7-36	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	36-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
27G----- Miami	0-6	Loam-----	CL, CL-ML, ML	A-4	0	100	95-100	80-100	50-90	15-30	3-10
	6-26	Clay loam, silty clay loam.	CL, SC	A-6	0	90-100	85-100	70-95	40-95	30-40	15-25
	26-31	Loam-----	CL, SC	A-4, A-6	0-3	85-100	85-100	70-90	40-90	25-35	8-15
	31-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-100	85-100	70-90	45-70	20-40	5-20
56A----- Dana	0-12	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	85-95	30-35	8-12
	12-39	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-98	38-50	20-32
	39-49	Clay loam-----	CL	A-6, A-7	0-3	90-100	90-95	80-90	65-75	37-50	17-30
	49-60	Loam-----	CL, ML, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	17-30	2-14
56B2----- Dana	0-9	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	85-95	30-35	8-12
	9-33	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-98	38-50	20-32
	33-54	Clay loam-----	CL	A-6, A-7	0-3	90-100	90-95	80-90	65-75	37-50	17-30
	54-60	Loam-----	CL, ML, CL-ML	A-4, A-6	0-3	85-95	80-90	75-85	50-65	17-30	2-14
134A----- Camden	0-12	Silt loam-----	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	12-33	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	90-100	25-40	15-25
	33-60	Clay loam, sandy loam, sandy clay loam.	ML, SC, SM, CL	A-2, A-4, A-6	0-5	90-100	85-100	60-100	30-70	20-40	3-15
134B2----- Camden	0-6	Silt loam-----	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	6-26	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	90-100	25-40	15-25
	26-60	Clay loam, sandy loam, sandy clay loam.	ML, SC, SM, CL	A-2, A-4, A-6	0-5	90-100	85-100	60-100	30-70	20-40	3-15
152----- Drummer	0-12	Silty clay loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	12-42	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	95-100	85-95	30-50	15-30
	42-49	Loam, silt loam, clay loam.	CL	A-6, A-7	0-5	95-100	90-100	75-95	60-85	30-50	15-30
	49-70	Stratified loamy sand to silty clay loam.	SC, CL	A-4, A-6	0-5	95-100	85-95	75-95	45-80	20-35	7-20
154A----- Flanagan	0-16	Silt loam-----	CL	A-7, A-6	0	100	100	95-100	85-100	35-50	15-30
	16-48	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	15-30
	48-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	85-100	80-100	70-95	50-85	20-45	5-30

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
221B2----- Parr	0-8	Silt loam-----	CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	50-90	15-30	4-15
	8-35	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	90-100	90-100	75-100	50-95	25-35	9-15
	35-40	Loam-----	CL	A-6, A-4	0	90-100	90-100	75-85	50-65	25-35	8-15
	40-60	Loam-----	CL, ML, CL-ML	A-4	0-3	85-95	85-95	75-85	50-65	<25	3-8
221C2----- Parr	0-7	Loam-----	CL, CL-ML	A-4, A-6	0	95-100	95-100	80-100	50-90	15-30	4-15
	7-29	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	90-100	90-100	75-100	50-95	25-35	9-15
	29-35	Loam-----	CL	A-6, A-4	0	90-100	90-100	75-85	50-65	25-35	8-15
	35-60	Loam-----	CL, ML, CL-ML	A-4	0-3	85-95	85-95	75-85	50-65	<25	3-8
234A----- Sunbury	0-8	Silt loam-----	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	8-15
	8-43	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	85-100	35-60	20-35
	43-60	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0-2	98-100	95-100	90-100	50-95	20-45	5-30
236A----- Sabina	0-13	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	13-44	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-60	20-40
	44-60	Clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0-5	95-100	85-100	70-100	55-75	20-50	5-30
244----- Hartsburg	0-13	Silty clay loam.	CL, ML	A-7, A-6	0	100	100	100	95-100	35-50	10-25
	13-41	Silty clay loam.	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-30
	41-60	Silt loam, loam.	CL	A-6	0	95-100	90-100	90-100	70-100	25-40	11-20
291A----- Xenia	0-11	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-35	5-15
	11-39	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	39-60	Clay loam, loam.	CL	A-6, A-7	0-5	90-100	85-95	70-95	50-80	30-45	10-25
291B2----- Xenia	0-6	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-35	5-15
	6-28	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	28-50	Clay loam, loam.	CL	A-6, A-7	0-5	90-100	85-95	70-95	50-80	30-45	10-25
	50-60	Loam-----	CL, CL-ML	A-4, A-6	0-5	90-95	85-95	65-95	50-75	20-30	5-15
330----- Peotone	0-22	Silty clay loam.	CH, CL	A-7	0	100	95-100	95-100	80-100	40-65	15-35
	22-47	Silty clay loam, silty clay.	CH, CL	A-7	0-5	100	95-100	90-100	85-100	40-70	15-40
	47-60	Silty clay loam, silt loam.	CL, CH, ML, MH	A-7, A-6	0-5	95-100	95-100	90-100	75-98	30-60	15-30

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
348A----- Wingate	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-30	4-11
	9-36	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-25
	36-47	Clay loam, loam.	CL, SC, CL-ML, SC-SM	A-6, A-4, A-2	0	90-100	80-95	50-90	25-75	25-40	5-20
	47-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-95	85-95	70-95	40-75	20-35	5-15
348B2----- Wingate	0-7	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	20-30	4-11
	7-30	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-25
	30-42	Clay loam, loam.	CL, SC, CL-ML, SC-SM	A-6, A-4, A-2	0	90-100	80-95	50-90	25-75	25-40	5-20
	42-60	Loam-----	CL, CL-ML, SC, SC-SM	A-4, A-6	0-3	85-95	85-95	70-95	40-75	20-35	5-15
353A----- Toronto	0-8	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	8-37	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	20-30
	37-60	Clay loam, loam.	CL	A-6, A-7	0	95-100	90-95	85-95	65-75	35-50	15-25
481A----- Raub	0-14	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-95	25-35	5-15
	14-35	Silty clay loam.	CL, CH	A-6, A-7	0	100	100	95-100	80-95	35-55	20-35
	35-52	Clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	90-100	85-95	60-85	35-50	15-25
	52-60	Loam, clay loam.	CL, ML, SC, SM	A-4, A-6	0-5	85-95	80-90	70-85	40-65	15-30	NP-15
496A----- Fincastle	0-11	Silt loam-----	CL, ML, CL-ML	A-4	0	100	95-100	90-100	75-93	<25	3-10
	11-32	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-15
	32-50	Clay loam, loam.	CL	A-6	0	95-100	90-98	85-95	75-85	30-40	10-15
	50-60	Loam, clay loam.	CL	A-4, A-6	0-3	88-96	82-90	70-86	50-66	25-30	8-11
1402----- Colo	0-30	Silty clay loam.	CL, CH	A-7	0	100	100	90-100	90-100	40-60	15-30
	30-56	Silty clay loam.	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
	56-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	80-100	40-55	15-30
3074----- Radford	0-13	Silt loam-----	ML, CL	A-4, A-6	0	100	100	95-100	80-100	30-40	5-15
	13-30	Silt loam-----	CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-35	5-15
	30-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	80-95	35-50	15-25

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
3107----- Sawmill	0-21	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	21-48	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	48-60	Silty clay loam, clay loam, loam.	CL	A-6, A-7, A-4	0	100	100	85-100	70-95	25-50	8-25
3132A----- Starks	0-16	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	90-100	80-100	20-35	4-15
	16-47	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	80-100	35-45	15-25
	47-60	Stratified sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0-5	90-100	80-100	70-100	60-90	15-30	4-15
3284----- Tice	0-18	Silty clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	10-20
	18-56	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	15-30
	56-60	Stratified silty clay loam to loam.	CL-ML, CL	A-4, A-6, A-7	0	100	100	60-95	55-80	25-45	5-20
3402----- Colo	0-28	Silty clay loam.	CL, CH	A-7	0	100	100	90-100	90-100	40-60	15-30
	28-54	Silty clay loam.	CL, CH	A-7	0	100	100	90-100	90-100	40-55	20-30
	54-60	Silty clay loam, clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	80-100	40-55	15-30
3451----- Lawson	0-8	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	20-40	5-20
	8-32	Silt loam, silty clay loam.	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	32-60	Silty clay loam, silt loam, loam.	CL	A-6, A-7	0	100	100	90-100	60-100	20-45	10-25
8077----- Huntsville	0-9	Silt loam-----	CL	A-6	0	100	95-100	90-100	85-100	25-40	10-20
	9-40	Silt loam-----	CL	A-6	0	100	95-100	90-100	85-100	20-35	10-20
	40-60	Silt loam, loam, very fine sandy loam.	CL-ML, CL, SC-SM, SC	A-4, A-6, A-2	0	95-100	90-100	85-95	30-85	20-35	5-20

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
27B2----- Miami	0-6	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.37	4	5	1-2
	6-39	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.8	Moderate-----	0.37			
	39-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27C2----- Miami	0-9	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.37	4	5	1-2
	9-40	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.8	Moderate-----	0.37			
	40-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27C3----- Miami	0-4	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37	3	6	.5-1
	4-33	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.8	Moderate-----	0.37			
	33-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27D----- Miami	0-9	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.37	4	5	1-2
	9-40	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.8	Moderate-----	0.37			
	40-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27D2----- Miami	0-7	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.37	4	5	1-2
	7-35	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.8	Moderate-----	0.37			
	35-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27D3----- Miami	0-3	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.37	3	6	.5-1
	3-25	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37			
	25-30	20-27	1.50-1.70	0.2-0.6	0.14-0.19	6.6-7.8	Low-----	0.37			
	30-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27F----- Miami	0-7	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.37	4	5	1-2
	7-36	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.8	Moderate-----	0.37			
	36-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
27G----- Miami	0-6	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.37	4	5	1-2
	6-26	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.3	Moderate-----	0.37			
	26-31	20-27	1.50-1.70	0.2-0.6	0.14-0.19	6.6-7.8	Low-----	0.37			
	31-60	15-25	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Moderate-----	0.37			
56A----- Dana	0-12	11-22	1.40-1.55	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.32	5	5	4-5
	12-39	27-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-----	0.43			
	39-49	27-35	1.45-1.65	0.6-2.0	0.15-0.19	6.1-7.3	Moderate-----	0.43			
	49-60	15-22	1.70-1.90	0.2-0.6	0.05-0.10	6.6-8.4	Low-----	0.43			
56B2----- Dana	0-9	11-22	1.40-1.55	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.32	5	5	3-4
	9-33	27-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-6.0	Moderate-----	0.43			
	33-54	27-35	1.45-1.65	0.6-2.0	0.15-0.19	6.1-7.3	Moderate-----	0.43			
	54-60	15-22	1.70-1.90	0.2-0.6	0.05-0.10	6.6-8.4	Low-----	0.43			
134A----- Camden	0-12	14-27	1.35-1.55	0.6-2.0	0.21-0.25	5.1-7.3	Low-----	0.37	5	6	1-2
	12-33	22-35	1.40-1.60	0.6-2.0	0.14-0.24	5.1-7.3	Moderate-----	0.37			
	33-60	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.1-7.3	Low-----	0.37			
134B2----- Camden	0-6	14-27	1.35-1.55	0.6-2.0	0.21-0.25	5.1-7.3	Low-----	0.37	5	6	1-2
	6-26	22-35	1.40-1.60	0.6-2.0	0.14-0.24	5.1-7.3	Moderate-----	0.37			
	26-60	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.1-7.3	Low-----	0.37			
152----- Drummer	0-12	27-35	1.10-1.30	0.6-2.0	0.21-0.23	5.6-7.8	Moderate-----	0.28	5	7	5-7
	12-42	20-35	1.20-1.45	0.6-2.0	0.21-0.24	5.6-7.8	Moderate-----	0.28			
	42-49	22-33	1.30-1.55	0.6-2.0	0.17-0.20	6.1-8.4	Moderate-----	0.28			
	49-70	15-32	1.40-1.70	0.6-2.0	0.11-0.19	6.6-8.4	Low-----	0.28			

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
154A----- Flanagan	0-16	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Moderate-----	0.28	5	6	4-5
	16-48	25-40	1.25-1.45	0.6-2.0	0.15-0.22	5.6-7.3	High-----	0.43			
	48-60	20-30	1.45-1.70	0.2-0.6	0.15-0.22	6.1-8.4	Low-----	0.37			
221B2----- Parr	0-8	12-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.32	4	5	2-4
	8-35	22-32	1.40-1.55	0.6-2.0	0.15-0.19	5.6-7.3	Moderate-----	0.32			
	35-40	20-25	1.55-1.65	0.6-2.0	0.15-0.17	6.6-7.8	Moderate-----	0.32			
	40-60	10-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low-----	0.32			
221C2----- Parr	0-7	12-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low-----	0.32	4	5	2-4
	7-29	22-32	1.40-1.55	0.6-2.0	0.15-0.19	5.6-7.3	Moderate-----	0.32			
	29-35	20-25	1.55-1.65	0.6-2.0	0.15-0.17	6.6-7.8	Moderate-----	0.32			
	35-60	10-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low-----	0.32			
234A----- Sunbury	0-8	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.32	5	6	2-4
	8-43	35-45	1.35-1.55	0.6-2.0	0.18-0.20	5.6-7.8	High-----	0.43			
	43-60	20-30	1.40-1.60	0.2-0.6	0.07-0.11	6.6-8.4	Low-----	0.43			
236A----- Sabina	0-13	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	6	1-2
	13-44	35-42	1.35-1.55	0.2-0.6	0.11-0.20	5.6-7.3	High-----	0.37			
	44-60	20-35	1.50-1.75	0.2-0.6	0.11-0.18	6.6-7.8	Low-----	0.37			
244----- Hartsburg	0-13	27-33	1.15-1.35	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.28	5	7	4-5
	13-41	27-35	1.20-1.50	0.6-2.0	0.18-0.20	6.6-8.4	Moderate-----	0.28			
	41-60	20-27	1.30-1.55	0.6-2.0	0.20-0.22	7.4-8.4	Low-----	0.28			
291A----- Xenia	0-11	11-22	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	5	1-2
	11-39	27-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	39-60	24-35	1.45-1.65	0.2-0.6	0.15-0.19	5.6-7.3	Moderate-----	0.37			
291B2----- Xenia	0-6	11-22	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	5	1-2
	6-28	27-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37			
	28-50	24-35	1.45-1.65	0.2-0.6	0.15-0.19	5.6-7.3	Moderate-----	0.37			
	50-60	12-20	1.70-1.90	0.2-0.6	0.05-0.10	7.4-8.4	Low-----	0.37			
330----- Peotone	0-22	33-40	1.20-1.40	0.2-0.6	0.21-0.23	5.6-7.8	High-----	0.28	5	4	5-7
	22-47	35-45	1.30-1.60	0.2-0.6	0.11-0.20	6.1-7.8	High-----	0.28			
	47-60	25-40	1.40-1.65	0.2-0.6	0.18-0.20	6.6-8.4	High-----	0.28			
348A----- Wingate	0-9	10-20	1.30-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.32	5	5	2-4
	9-36	27-33	1.40-1.55	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.43			
	36-47	15-30	1.40-1.60	0.6-2.0	0.12-0.19	6.1-7.3	Moderate-----	0.43			
	47-60	15-24	1.60-1.80	0.2-0.6	0.17-0.19	7.4-8.4	Low-----	0.43			
348B2----- Wingate	0-7	10-20	1.30-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.32	5	5	2-4
	7-30	27-33	1.40-1.55	0.6-2.0	0.18-0.22	5.1-6.5	Moderate-----	0.43			
	30-42	15-30	1.40-1.60	0.6-2.0	0.12-0.19	6.1-7.3	Moderate-----	0.43			
	42-60	15-24	1.60-1.80	0.2-0.6	0.17-0.19	7.4-8.4	Low-----	0.43			
353A----- Toronto	0-8	18-27	1.30-1.45	0.6-2.0	0.22-0.24	5.1-6.5	Low-----	0.32	5	5	3-4
	8-37	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.32			
	37-60	20-32	1.50-1.70	0.2-0.6	0.15-0.19	6.6-8.4	Moderate-----	0.32			
481A----- Raub	0-14	20-27	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.28	5	6	2-4
	14-35	27-35	1.50-1.70	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	35-52	27-35	1.50-1.70	0.6-2.0	0.15-0.19	6.1-7.3	Moderate-----	0.37			
	52-60	20-32	1.50-1.70	0.2-0.6	0.05-0.19	7.4-8.4	Low-----	0.37			
496A----- Fincastle	0-11	11-22	1.40-1.55	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	5	1-2
	11-32	23-35	1.45-1.65	0.6-2.0	0.18-0.20	5.1-6.5	Moderate-----	0.37			
	32-50	24-32	1.45-1.65	0.6-2.0	0.15-0.19	5.1-7.8	Moderate-----	0.37			
	50-60	20-32	1.55-1.90	0.2-0.6	0.05-0.19	7.4-8.4	Low-----	0.37			

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth		Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi- bility group	Organic matter Pct
	In	Pct							K	T		
			g/cc	In/hr	In/in	pH						
1402----- Colo	0-30	27-36	1.28-1.32	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	7	5-7	
	30-56	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.28				
	56-60	25-35	1.35-1.45	0.6-2.0	0.18-0.20	6.1-7.3	Moderate-----	0.32				
3074----- Radford	0-13	18-27	1.40-1.60	0.6-2.0	0.22-0.24	5.6-7.8	Low-----	0.28	5	6	2-4	
	13-30	18-27	1.40-1.60	0.6-2.0	0.20-0.22	6.1-7.8	Low-----	0.28				
	30-60	24-35	1.35-1.55	0.6-2.0	0.18-0.20	6.6-7.8	Moderate-----	0.28				
3107----- Sawmill	0-21	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-----	0.28	5	7	4-5	
	21-48	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate-----	0.28				
	48-60	25-35	1.30-1.45	0.6-2.0	0.17-0.20	6.1-7.8	Moderate-----	0.28				
3132A----- Starks	0-16	18-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	6	2-4	
	16-47	27-35	1.35-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate-----	0.37				
	47-60	10-30	1.45-1.75	0.6-2.0	0.16-0.20	5.6-7.8	Low-----	0.37				
3284----- Tice	0-18	27-35	1.25-1.45	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.32	5	7	2-4	
	18-56	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.32				
	56-60	15-30	1.40-1.60	0.6-2.0	0.11-0.18	5.6-7.8	Moderate-----	0.32				
3402----- Colo	0-28	27-36	1.28-1.32	0.6-2.0	0.21-0.23	5.6-7.3	Moderate-----	0.28	5	7	5-7	
	28-54	30-35	1.25-1.35	0.6-2.0	0.18-0.20	5.6-7.3	Moderate-----	0.28				
	54-60	25-35	1.35-1.45	0.6-2.0	0.18-0.20	6.1-7.3	Moderate-----	0.32				
3451----- Lawson	0-8	18-27	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.8	Low-----	0.28	5	6	4-7	
	8-32	18-30	1.20-1.55	0.6-2.0	0.18-0.22	6.1-7.8	Low-----	0.28				
	32-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43				
8077----- Huntsville	0-9	18-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.8	Moderate-----	0.28	5	6	3-4	
	9-40	18-27	1.20-1.40	0.6-2.0	0.20-0.22	5.6-7.8	Moderate-----	0.28				
	40-60	10-25	1.20-1.50	0.6-2.0	0.17-0.21	5.6-7.8	Low-----	0.28				

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
27B2, 27C2, 27C3, 27D, 27D2, 27D3, 27F, 27G----- Miami	B	None-----	---	---	Ft >6.0	---	---	Moderate	Moderate	Moderate.
56A, 56B2----- Dana	B	None-----	---	---	3.0-6.0	Apparent	Mar-Apr	High-----	Moderate	Moderate.
134A, 134B2----- Camden	B	None-----	---	---	>6.0	---	---	High-----	Low-----	Moderate.
152----- Drummer	B/D	None-----	---	---	.5-2.0	Apparent	Mar-Jun	High-----	High-----	Moderate.
154A----- Flanagan	B	None-----	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
221B2, 221C2----- Parr	B	None-----	---	---	>6.0	---	---	Moderate	High-----	Moderate.
234A----- Sunbury	B	None-----	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
236A----- Sabina	C	None-----	---	---	1.5-3.5	Apparent	Mar-Jun	High-----	High-----	Moderate.
244----- Hartsburg	B/D	None-----	---	---	.5-2.0	Apparent	Mar-Jun	High-----	High-----	Low.
291A, 291B2----- Xenia	B	None-----	---	---	2.0-3.5	Apparent	Dec-Apr	High-----	High-----	Moderate.
330----- Peotone	B/D	None-----	---	---	.5-1.0	Apparent	Feb-Jul	High-----	High-----	Moderate.
348A, 348B2----- Wingate	B	None-----	---	---	2.5-5.0	Apparent	Dec-May	High-----	High-----	Moderate.
353A----- Toronto	C	None-----	---	---	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	High.
481A----- Raub	C	None-----	---	---	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	Moderate.
496A----- Fincastle	C	None-----	---	---	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	Moderate.
1402----- Colo	B/D	Frequent----	Long-----	Feb-Nov	+ .5-1.0	Apparent	Nov-Jul	High-----	High-----	Moderate.
3074----- Radford	B	Frequent----	Brief-----	Mar-Jun	1.0-3.0	Apparent	Mar-Jun	High-----	High-----	Low.
3107----- Sawmill	B/D	Frequent----	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	High-----	High-----	Low.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
3132A----- Starks	C	Frequent----	Brief-----	Dec-Mar	1.0-3.0	Apparent	Jan-Apr	High-----	High-----	Moderate.
3284----- Tice	B	Frequent----	Brief-----	Jan-Jun	1.5-3.0	Apparent	Mar-Jun	High-----	High-----	Low.
3402----- Colo	B/D	Frequent----	Brief-----	Feb-Nov	1.0-3.0	Apparent	Nov-Jul	High-----	High-----	Moderate.
3451----- Lawson	C	Frequent----	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	High-----	Moderate	Low.
8077----- Huntsville	B	Occasional	Very brief or brief.	Jan-Jun	>6.0	---	---	High-----	Low-----	Low.

TABLE 19.--ENGINEERING INDEX TEST DATA

(MAX means maximum dry density; OPT, optimum moisture; LL, liquid limit; PI, plasticity index; and UN, Unified)

Soil name and location	Sample number	Horizon	Depth	Moisture density		Percentage passing sieve--				LL	PI	Classification	
				MAX	OPT	No. 4	No. 10	No. 40	No. 200			AASHTO	UN
				In	Lb/ cu ft	Pct					Pct		
Colo silty clay loam, frequently flooded: 300 feet west and 40 feet south of the northeast corner of sec. 5, T. 14 N., R. 5 E.	90IL-139-1-1	Ap	0-8	97	22	100	100	100	96	46	19	A-7-6(21)	ML
	90IL-139-1-2	A	8-33	100	22	100	100	99	88	42	18	A-7-6(17)	CL
	90IL-139-1-5	Bg1,Bg2	33-49	110	15	100	99	98	84	38	18	A-6(15)	CL
	90IL-139-1-7	Bg3,Bg4	49-60	112	16	100	97	94	80	36	17	A-6(13)	CL
Parr silt loam, 2 to 5 percent slopes, eroded: 450 feet east and 1,200 feet south of the northwest corner of sec. 1, T. 13 N., R. 5 E.	90IL-139-2-1	Ap	0-9	106	18	99	99	96	84	33	14	A-6(11)	CL
	90IL-139-2-2	Bt1,Bt2	9-24	107	14	97	95	91	70	36	16	A-6(10)	CL
	90IL-139-2-4	Bt3,Bt4,BC	24-57	118	13	97	95	88	69	30	13	A-6(7)	CL
	90IL-139-2-7	C	57-65	122	12	97	94	89	68	24	9	A-4(3)	CL
Sabina silt loam, 0 to 2 percent slopes: 1,275 feet west and 1,850 feet south of the northeast corner of sec. 17, T. 15 N., R. 5 E.	90IL-139-3-1	Ap,E	0-9	106	16	100	99	96	90	28	5	A-4(4)	ML
	90IL-139-3-3	Bt1,Bt2,Bt3	9-32	101	20	100	100	99	96	45	20	A-7-6(22)	CL
	90IL-139-3-6	Bt4	32-43	112	16	100	100	99	93	33	14	A-6(13)	CL
	90IL-139-3-7	2Bt5	43-55	128	13	95	93	88	71	21	5	A-4(1)	ML-CL
	90IL-139-3-8	2C	55-65	121	13	97	95	91	71	22	7	A-4(0)	ML
Xenia silt loam, 2 to 5 percent slopes, eroded: 50 feet south and 1,050 feet west of the northeast corner of sec. 25, T. 13 N., R. 5 E.	90IL-139-4-1	Ap	0-6	105	17	100	99	98	92	33	10	A-4(9)	CL
	90IL-139-4-2	Bt	6-28	101	20	100	100	99	94	38	15	A-6(15)	CL
	90IL-139-4-5	2Bt	28-50	113	15	99	98	94	71	29	12	A-6(6)	CL
	90IL-139-4-7	2C	50-60	122	13	98	97	92	72	22	8	A-4(3)	CL

TABLE 20.--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
Camden-----	Fine-silty, mixed, mesic Typic Hapludalfs
Colo-----	Fine-silty, mixed, mesic Cumulic Haplaquolls
Dana-----	Fine-silty, mixed, mesic Typic Argiudolls
Drummer-----	Fine-silty, mixed, mesic Typic Haplaquolls
Fincastle-----	Fine-silty, mixed, mesic Aeric Ochraqualfs
Flanagan-----	Fine, montmorillonitic, mesic Aquic Argiudolls
Hartsburg-----	Fine-silty, mixed, mesic Typic Haplaquolls
Huntsville-----	Fine-silty, mixed, mesic Cumulic Hapludolls
Lawson-----	Fine-silty, mixed, mesic Cumulic Hapludolls
Miami-----	Fine-loamy, mixed, mesic Typic Hapludalfs
*Parr-----	Fine-loamy, mixed, mesic Typic Argiudolls
Peotone-----	Fine, montmorillonitic, mesic Cumulic Haplaquolls
Radford-----	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Raub-----	Fine-silty, mixed, mesic Aquic Argiudolls
Sabina-----	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Sawmill-----	Fine-silty, mixed, mesic Cumulic Haplaquolls
Starks-----	Fine-silty, mixed, mesic Aeric Ochraqualfs
Sunbury-----	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Tice-----	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Toronto-----	Fine-silty, mixed, mesic Udollic Ochraqualfs
Wingate-----	Fine-silty, mixed, mesic Mollic Hapludalfs
Xenia-----	Fine-silty, mixed, mesic Aquic Hapludalfs

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